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*1944*

# TM 9-793

WAR DEPARTMENT TECHNICAL MANUAL

*U.S. Dept. of Army*

## TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

### RESTRICTED DISSEMINATION OF RESTRICTED MATTER —

The information contained in restricted documents and the essential characteristics of restricted material may be given to any person known to be in the service of the United States and to persons of undoubted loyalty and discretion who are cooperating in Government work, but will not be communicated to the public or to the press except by authorized military public relations agencies. (See also paragraph 23b, AR 380-5, 15 March 1944.)

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# TRAILER, AMMUNITION, M23 (8-TON 4-WHEEL)



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WAR DEPARTMENT  
Washington 25, D. C., 12 August 1944

TM 9-793, Trailer, Ammunition, M23 (8-ton, 4-wheel), is published for the information and guidance of all concerned.

[ A.G. 300.7 (11 Apr 44)  
O.O.M. 461/Raritan Arsenal (14 Aug 44) R ]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,  
*Chief of Staff.*

OFFICIAL:

J. A. ULIO,  
*Major General,  
The Adjutant General.*

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IC 6—T/O & E 6-36, Hg & Hg Btry, FA Bn (Mtrz)  
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How or 4.5 in. Gun, Trac-D); 6-339, Sv Btry,  
Mtz, FA Bn, 155-mm How or 4.5 in. Gun,  
Trac-D.

(For explanation of symbols, see FM 21-6.)

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## RESTRICTED

# PART ONE — GENERAL

### Section I

## INTRODUCTION

### 1. SCOPE.

a. These instructions\* are published for the information and guidance of the personnel to whom this equipment is assigned. They contain information on the operation and maintenance of the 8-ton, 4-wheel Ammunition Trailer M23, and the 155-mm Limber M5, as well as descriptions of the major units and their functions in relation to the other components of this vehicle.

b. This manual has the following arrangement:

(1) Part One, General, contains description and data. It lists the tools, spare parts, and equipment carried on the vehicle. It also lists special tools required for maintenance of the vehicle and indicates the echelon of maintenance to which each tool is allocated.

(2) Part Two, Operating Instructions, contains instructions for the operation of the vehicle with description and location of the controls and instruments.

(3) Part Three, Organizational Maintenance Instructions, contains information needed for the performance of the scheduled lubrication and preventive maintenance services, and instructions for maintenance operations which are the responsibility of the using organizations (first and second echelons).

(4) Part Four, Ordnance Maintenance Instructions, contains information for the guidance of the third and fourth echelons of maintenance. For Ordnance maintenance information on certain of the Bendix-Westinghouse air brakes equipment, refer to TM 9-1827A.

(5) The appendix contains instructions for shipment and limited storage, and a list of references including standard nomenclature lists, technical manuals, and other publications applicable to the vehicle.

### 2. RECORDS.

a. Forms and records applicable for use in performing prescribed operations are listed below with brief explanations of each.

(1) STANDARD FORM NO. 26, DRIVER'S REPORT — ACCIDENT, MOTOR TRANSPORTATION. One copy of this form will be kept with the

\*To provide operating instructions with the materiel, this technical manual has been published in advance of complete technical review. Any errors or omissions will be corrected by changes or, if extensive, by an early revision.

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vehicle at all times. In case of an accident resulting in injury or property damage, it will be filled out by the driver on the spot, or as promptly as practical thereafter.

(2) **WAR DEPARTMENT FORM NO. 48 DRIVER'S TRIP TICKET AND PREVENTIVE MAINTENANCE SERVICE RECORD.** This form properly executed, will be furnished to the driver when his vehicle is dispatched on non-tactical missions. The driver and the official user of the vehicle will complete, in detail, appropriate parts of this form. These forms need not be issued for vehicles in convoy or on tactical missions. The reverse side of this form contains the driver's daily and weekly preventive maintenance service reminder schedule.

(3) **W.D., A.G.O. FORM NO. 478, MWO AND MAJOR UNIT ASSEMBLY REPLACEMENT RECORD.** This form will be used by all personnel completing a modification or major unit assembly replacement to record clearly, the description of work completed, date, vehicle hours, and/or mileage, and MWO number or nomenclature of unit assembly. Personnel performing the operation will initial in the column provided. Minor repairs, parts, and accessory replacements will not be recorded.

(4) **W.D., A.G.O. FORM NO. 6, DUTY ROSTER.** This form, slightly modified, will be used for scheduling and maintaining a record of vehicle maintenance operations. It may be used for lubrication records.

(5) **W.D., A.G.O. FORM NO. 461, PREVENTIVE MAINTENANCE SERVICE AND TECHNICAL INSPECTION WORK SHEET FOR WHEELED AND HALF-TRACK VEHICLES.** This form will be used for all 1,000-mile (monthly) and 6,000-mile (semiannual) maintenance services and all technical inspections performed on wheeled or half-track vehicles.

(6) **W.D., A.G.O. FORM NO. 7353, SPOT-CHECK INSPECTION REPORT FOR ALL MOTOR VEHICLES.** This form may be used by all commanding officers or their staff representatives in making spot-check inspections on all vehicles.

(7) **W.D., A.G.O. FORM NO. 468, UNSATISFACTORY EQUIPMENT RECORD.** This form will be used for reporting manufacturing, design, or operational defects in materiel with a view to improving and correcting such defects, and for use in recommending modifications of materiel. This form will not be used for reporting failures, isolated materiel defects, or malfunctions of materiel resulting from fair wear and tear or accidental damage, nor for the replacement, repair, or the issue of parts and equipment. It does not replace currently authorized operational or performance records.

(8) **W.D., O.O. FORM NO. 7370, EXCHANGE PART OR UNIT IDENTIFICATION TAG.** This tag, properly executed, may be used when exchanging unserviceable items for like serviceable assemblies, subassemblies, parts, vehicles, and tools.

## Section II

**DESCRIPTION AND DATA****3. DESCRIPTION.**

a. **Ammunition Trailer M23** (figs. 1, 2, and 3). The Ammunition Trailer M23 is a four-wheeled vehicle designed to transport a cargo of 96 rounds of 155-mm or 60 rounds of 8-inch or 32 rounds of 240-mm ammunition from the supply dumps to the point of use. It can be used with the Heavy Carriage Limber M5 supporting the front of the vehicle (fig. 5) or can be directly attached to the 7½-ton prime mover truck (fig. 6) or attached to the limber, can be drawn as a tandem unit behind another ammunition trailer. In either case, 6,000 pounds of the gross load is taken by the supporting vehicle.

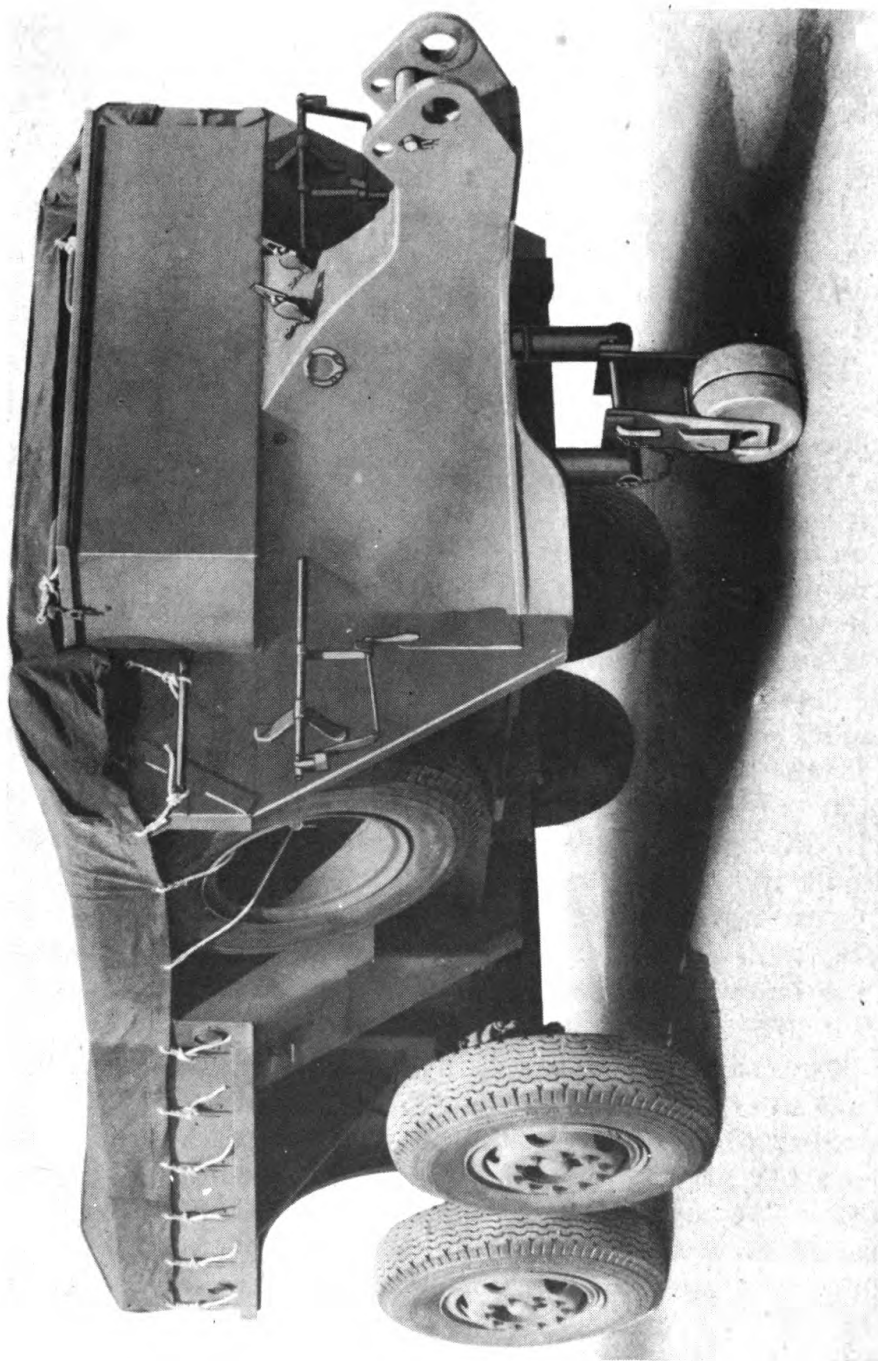
(1) **TRAILER BODY.** The trailer body and frame are integral; the whole becoming a structure fabricated by welding steel plates of varying thicknesses and shapes into a unit. The floor plate, stamped to take the three sizes of ammunition which can be carried, is welded to the lower supporting members. A second plate, of lighter material, is welded on the under side of the floor supporting members to protect the ammunition rounds from dirt, flying sand, or gravel. Adjustable hinged sections are perforated to fit snugly over the upper ends of the shells, and to hold them securely while being transported (fig. 4). A pair of doors, vertically hinged, at the rear of the body, permit floor level loading (fig. 15). A trolley hoist (fig. 40) is provided with each vehicle for the loading operation. A compartment is provided, in the left side of the vehicle, to carry the hoist pole and boom assemblies (fig. 15). The chain hoist and trolley are carried in a compartment built into the right side of the body (fig. 12). A pintle hook, bolted to the body rear crossmember, is used to tow a second limber mounted trailer (fig. 15). A fuse box (fig. 10), at the front of the body proper, carries the ammunition fuses, primers and some of the on-vehicle tools.

(2) **TRAILER SUSPENSION.** The greater part of the trailer gross load is carried on two semielliptic rear springs which are mounted on the center cross axle. The ends of the upper spring leaf act as wear plates, and take the load directly from shackles welded to the trailer body sides. The bogie-type suspension consists of a center cross axle which carries on either end a fully rotative walking beam frame. A stub axle at each end of the walking beam supports a wheel and brake assembly. Alinement of the suspension is maintained by means of adjustable radius rods.

b. **Heavy Carriage Limber M5** (figs. 7 and 8). The Heavy Carriage Limber M5 is a two-wheeled unit used to tow the ammunition trailer and to support a portion of the gross load. It is composed of the draw bar, axle, and towing bracket assemblies (figs. 7 and 8). The



TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 334962

**Figure 1 — Ammunition Trailer M23 — Three-quarter Front View**

DESCRIPTION AND DATA

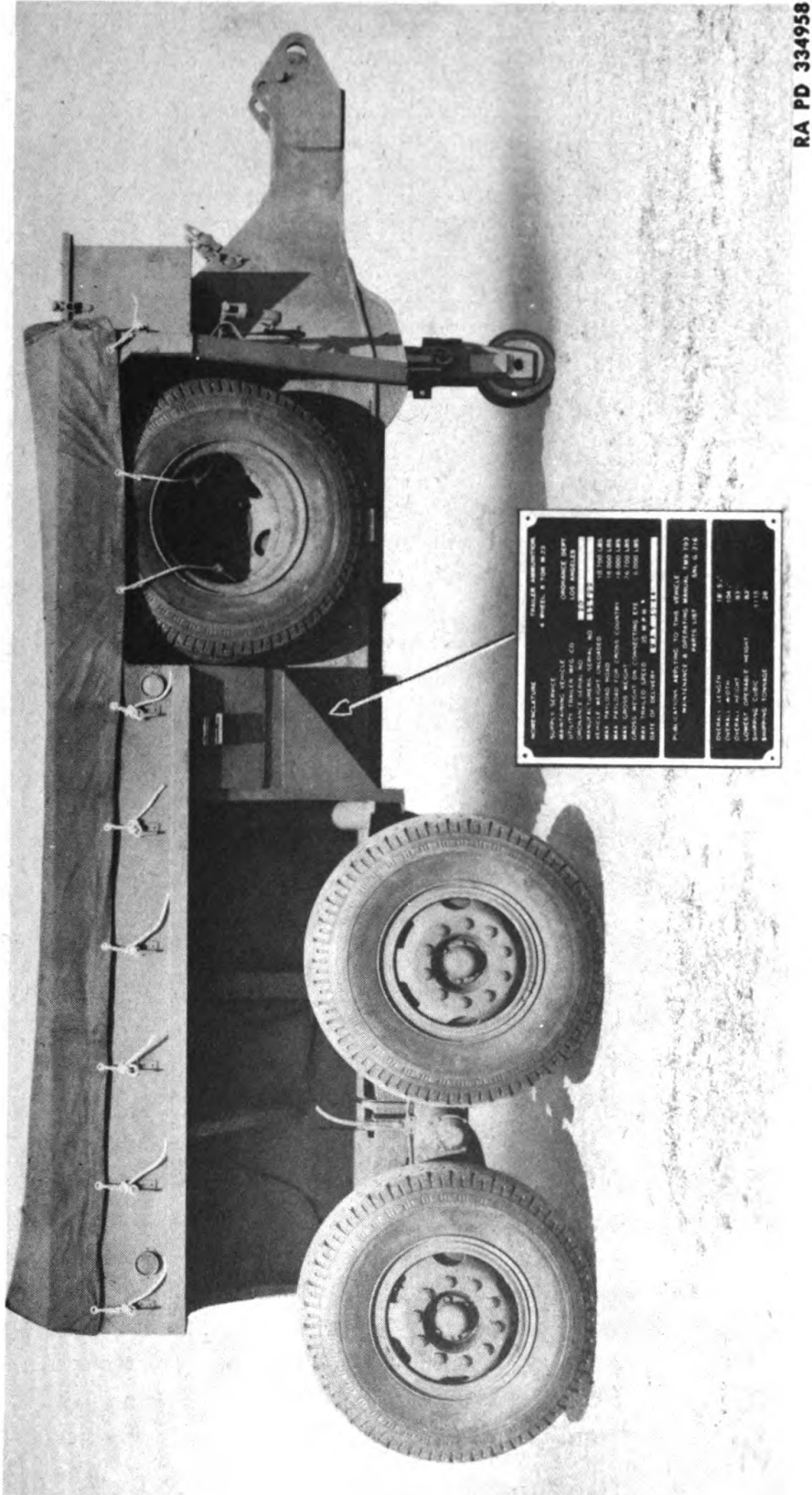


Figure 2 — Ammunition Trailer M23 — Right Side View

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RA PD 334959

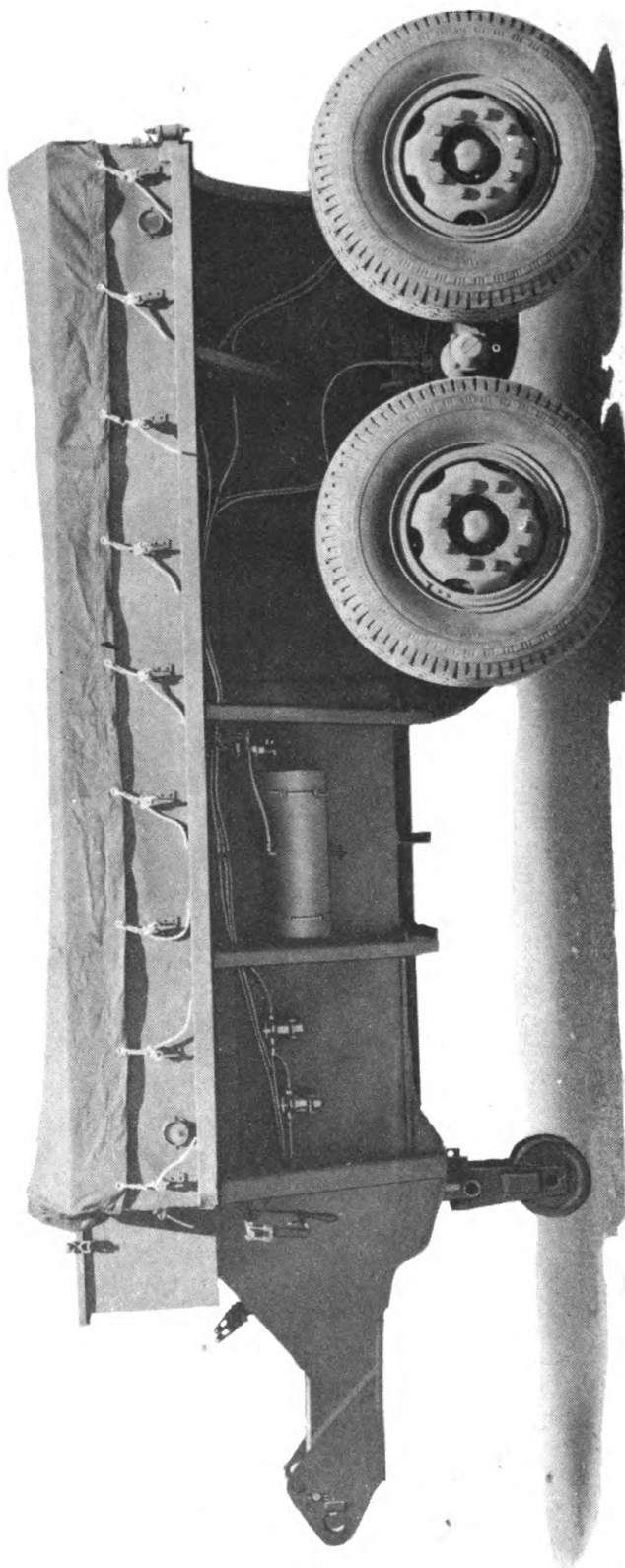
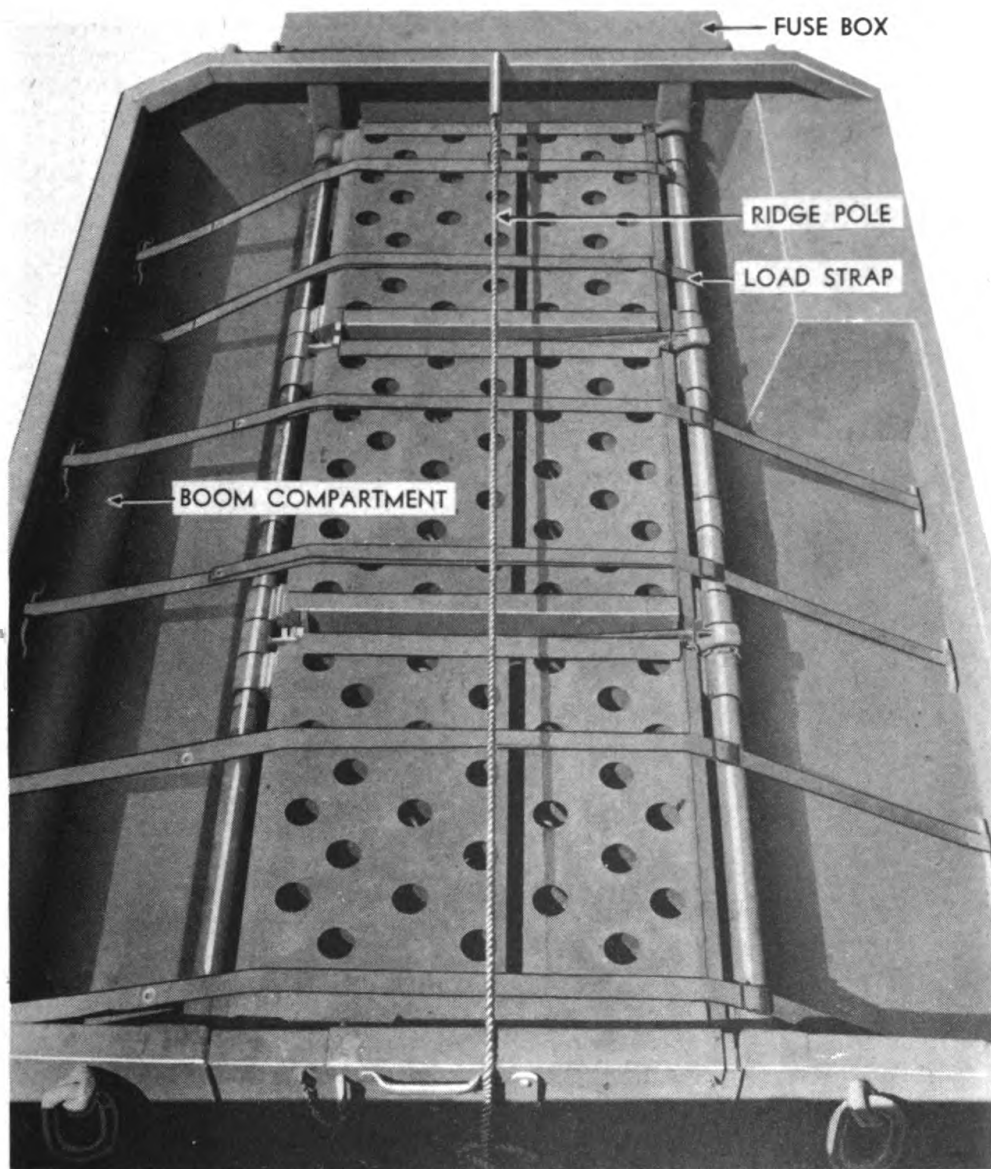


Figure 3 — Ammunition Trailer M23 — Left Side View

## DESCRIPTION AND DATA



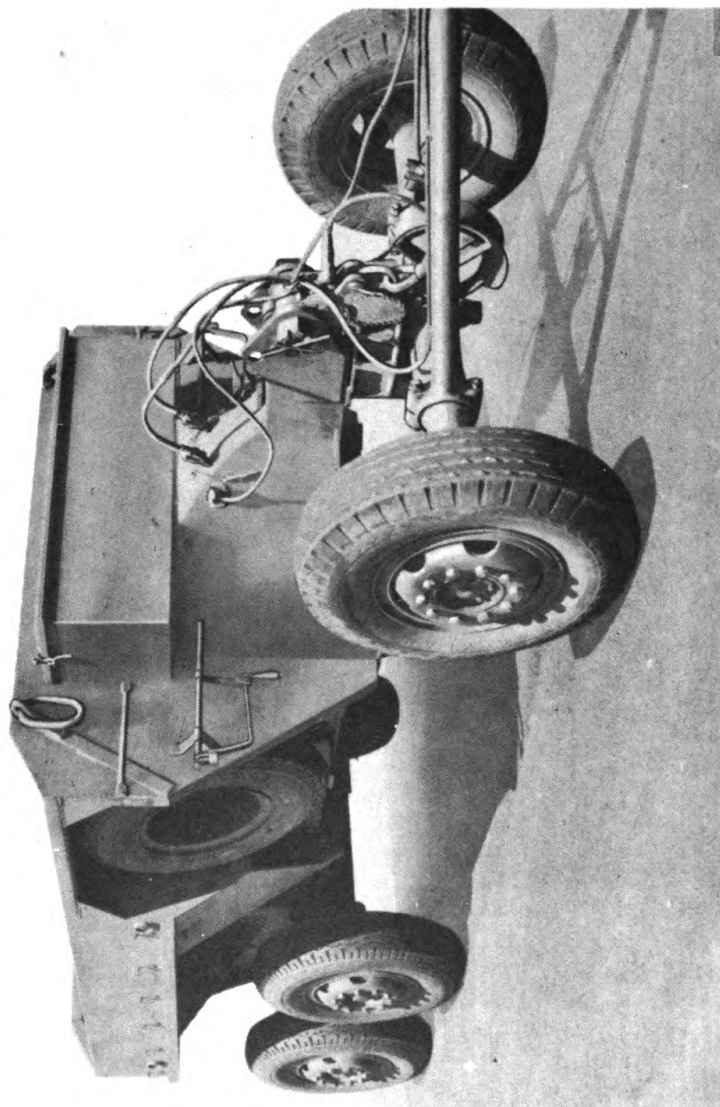
RA PD 334960

**Figure 4 — Ammunition Trailer M23 — Top View Minus Tarpaulin**

draw bar is a tubular A-frame at the front of which is mounted a spring-loaded lunette (fig. 7). The rear of the draw bar ends in bronze backed bearings which enclose the mating bearing surfaces of the fully rotative axle. The axle ends mount roller bearing hubs carrying wheels which interchange with those on the trailer.

The towing bracket (fig. 8) is carried on a rocker pin which is locked into, and supported by, the bracket spindle. The upper and lower bearing surfaces of the spindle turn in bronze bushings, mounted in the center of the limber axle.

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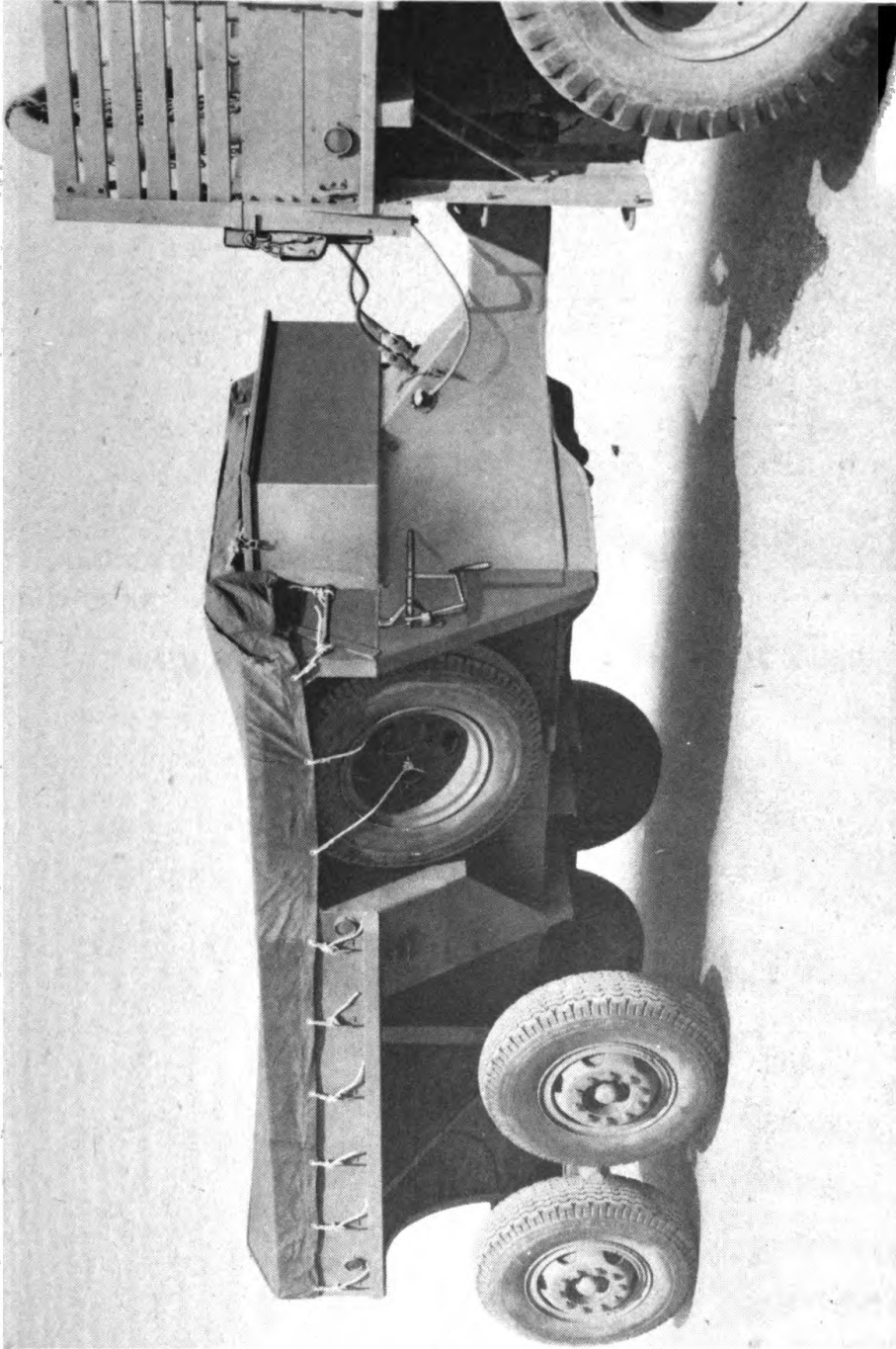


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**Figure 5 — Ammunition Trailer M23 — With Limber M5**



DESCRIPTION AND DATA

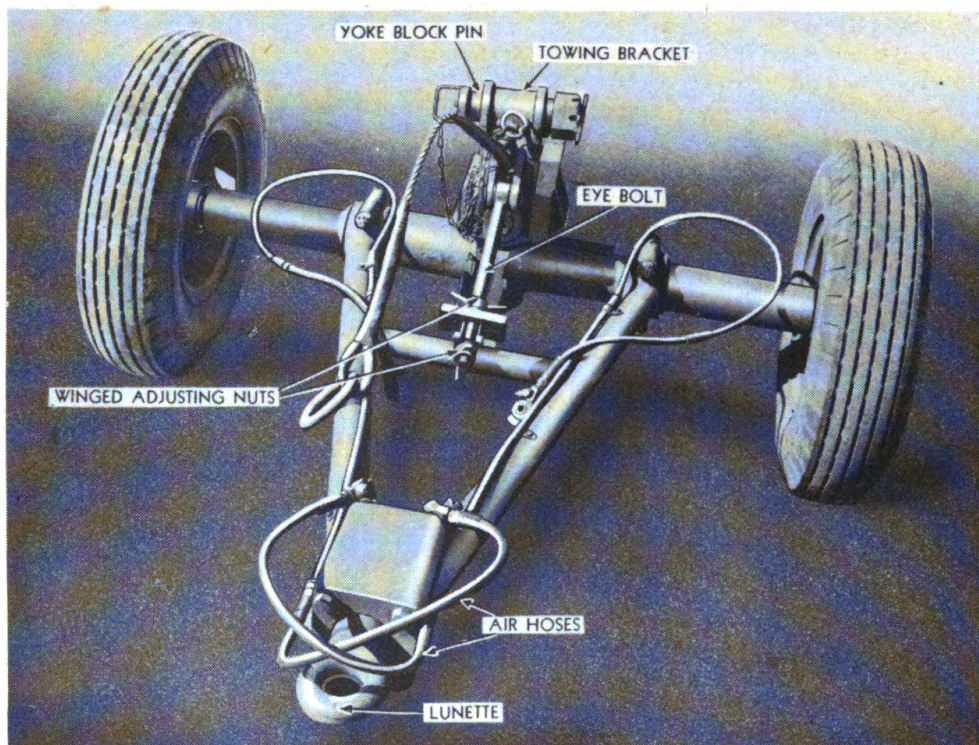


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**Figure 6 — Ammunition Trailer M23 — With 7 1/2-ton Prime Mover Truck**

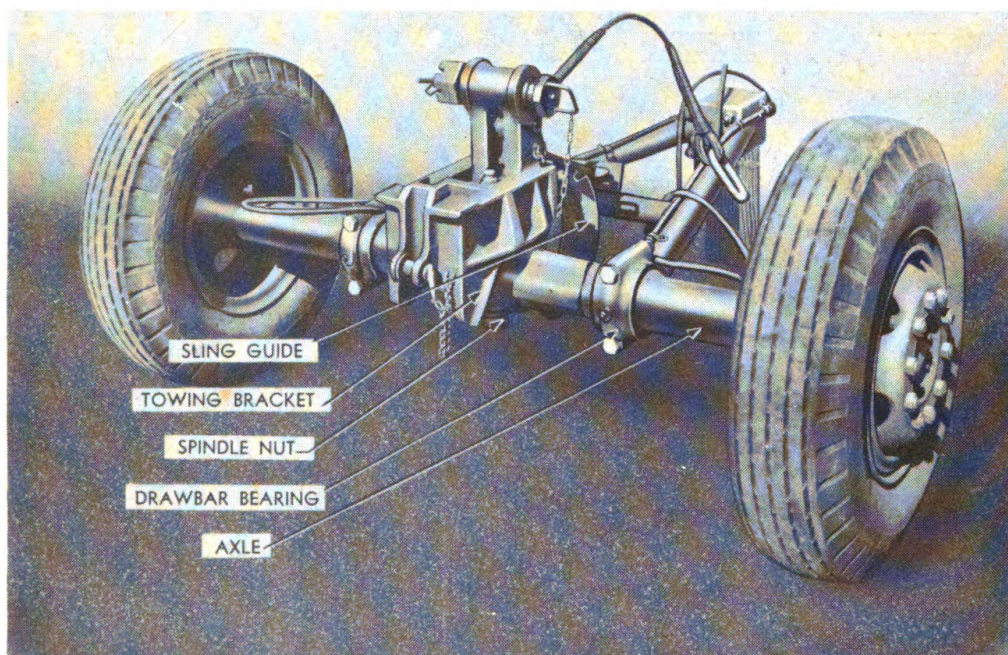


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RA PD 334970

**Figure 7 — Heavy Carriage Limber M5 — Front View**



RA PD 334971

**Figure 8 — Heavy Carriage Limber M5 — Three-quarter Right Rear View**

## DESCRIPTION AND DATA

### 4. DATA.

#### a. Ammunition Trailer M23.

##### (1) SPECIFICATIONS.

|                                                        |                |
|--------------------------------------------------------|----------------|
| Length over-all .....                                  | 18 ft 5½ in.   |
| Width over-all .....                                   | 8 ft 8¾ in.    |
| Height over-all (empty) .....                          | 6 ft 11 in.    |
| Height at king pin (loaded) .....                      | 40½ in.        |
| Shipping cubic .....                                   | 1,115 cubic ft |
| Wheel size .....                                       | 9.10 x 20      |
| Tires:                                                 |                |
| Size .....                                             | 11.00 x 20     |
| Inflation pressure .....                               | 70 lb          |
| No. of plies .....                                     | 12             |
| Tread type .....                                       | Hiway          |
| Tread (center to center) .....                         | 7 ft 4½ in.    |
| Weight of vehicle (equipped) .....                     | 10,710 lb      |
| Maximum gross weight .....                             | 26,710 lb      |
| Weight on connecting eye (vehicle loaded) .....        | 6,000 lb       |
| Ground clearance under rear crossmember (loaded) ..... | 13½ in.        |
| Ground clearance under rear axle .....                 | 1 ft 6 in.     |

##### (2) PERFORMANCE

|                       |                        |
|-----------------------|------------------------|
| Allowable speed ..... | 35 mph                 |
| Towing facilities:    |                        |
| Front .....           | Dual connection plates |
| Rear .....            | Pintle hook            |
| Turning radius .....  | 16 ft 3 in.            |

#### b. Heavy Carriage Limber M5.

##### (1) SPECIFICATIONS.

|                                                              |              |
|--------------------------------------------------------------|--------------|
| Length (center of lunette to center of yoke block pin) ..... | 6 ft 2 in.   |
| Length over-all .....                                        | 8 ft 1½ in.  |
| Width over-all .....                                         | 8 ft         |
| Wheel size .....                                             | 9.10 x 20    |
| Tires:                                                       |              |
| Size .....                                                   | 11.00 x 20   |
| Inflation pressure .....                                     | 70 lb        |
| No. of plies .....                                           | 12           |
| Tread type .....                                             | Hiway        |
| Tread (center to center) .....                               | 6 ft 11½ in. |
| Weight of vehicle .....                                      | 1,880 lb     |
| Ground clearance under bracket spindle (loaded) .....        | 12¼ in.      |

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Section III

VEHICLE STOWAGE AND SPECIAL TOOLS

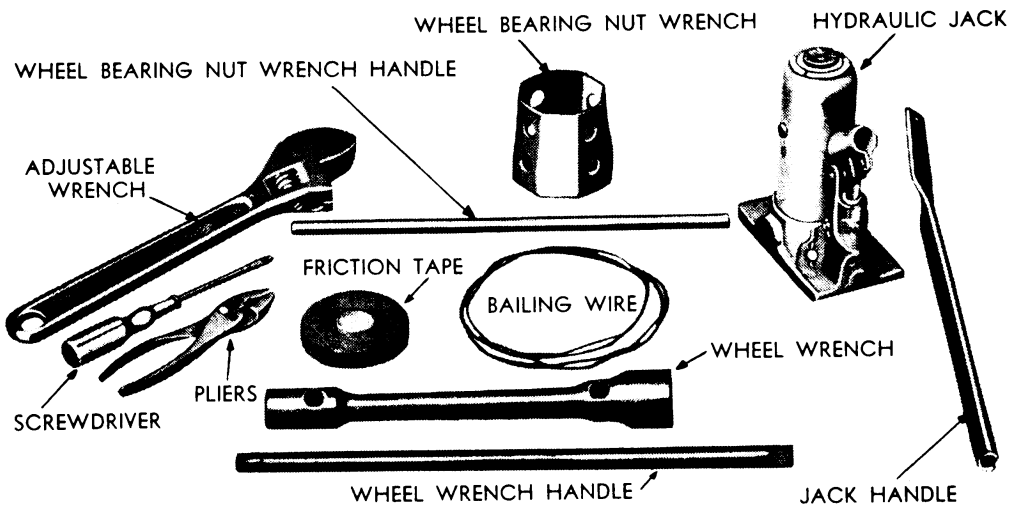
5. PURPOSE.

a. The lists in this section are for information only. They are not to be used as a basis for requisition.

6. VEHICLE STOWAGE.

a. On-vehicle Tools.

| Quantity<br>Per Vehicle | Item Name                         | Stowage<br>Location |
|-------------------------|-----------------------------------|---------------------|
| 1.                      | WRENCH, wheel bearing nut         | Hoist compartment   |
| 1.                      | HANDLE, wrench, wheel bearing nut | Hoist compartment   |
| 1.                      | WRENCH, wheel nut                 | Fuse box            |
| 1.                      | HANDLE, wrench, wheel nut         | Fuse box            |
| 1.                      | PLIERS, 8-inch                    | Fuse box            |
| 1.                      | WRENCH, adjustable, 18-inch       | Fuse box            |
| 1.                      | WIRE, bailing, roll, 10 feet      | Fuse box            |
| 1.                      | FRICTION TAPE, roll, 3/4 in. wide | Fuse box            |
| 1.                      | JACK, hydraulic, 5-ton            | Hoist compartment   |
| 1.                      | HANDLE, jack                      | Hoist compartment   |
| 1.                      | SCREWDRIVER, 5-in. blade          | Fuse box            |

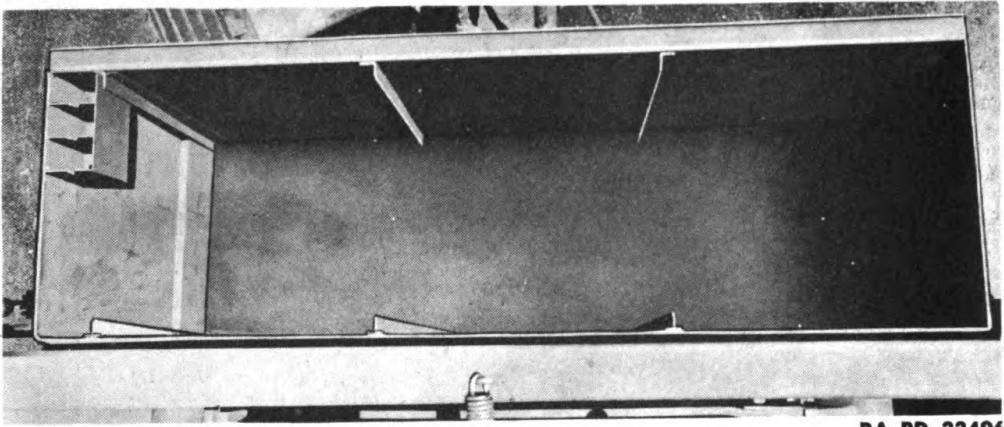


RA PD 334972

Figure 9 — On Vehicle Tools

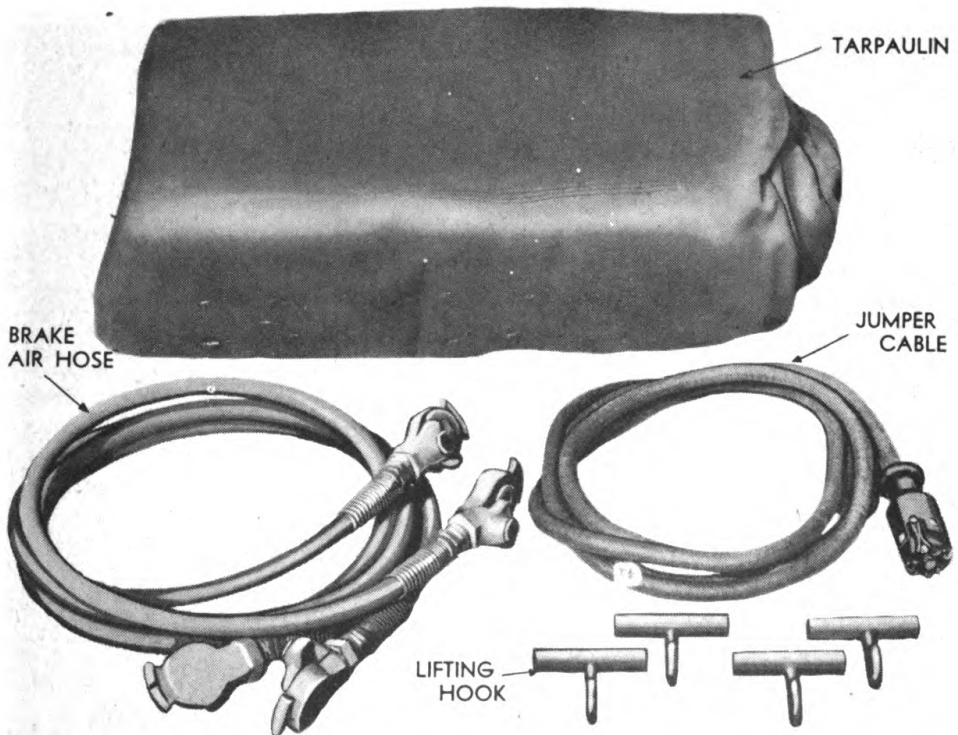


# VEHICLE STOWAGE AND SPECIAL TOOLS



RA PD 334967

**Figure 10 – Fuse Box**



RA PD 334973

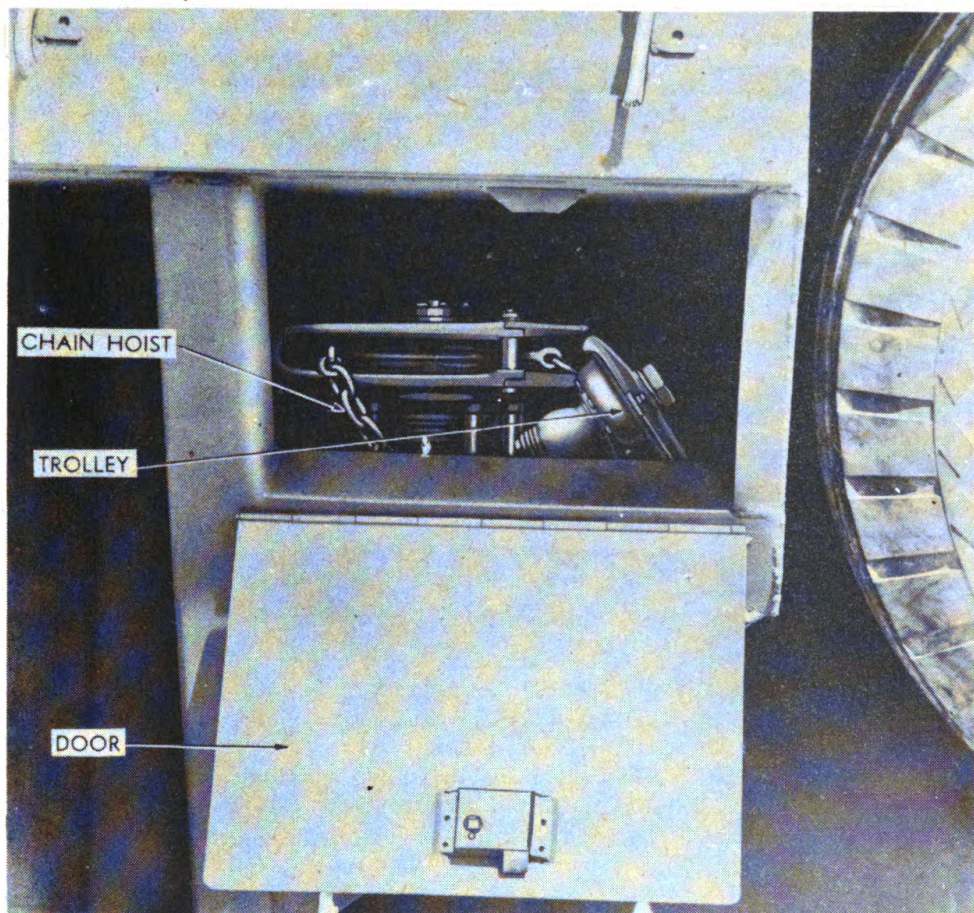
**Figure 11 – On Vehicle Equipment**

## b. Equipment.

| Quantity<br>Per Vehicle | Item Name                                | Stowage<br>Location |
|-------------------------|------------------------------------------|---------------------|
| 1.                      | TARPAULIN                                | On vehicle          |
| 4.                      | HOOKS, shell lifting                     | Fuse box            |
| 1.                      | CABLE AND PLUGS, jumper, 12 ft<br>length | Fuse box            |

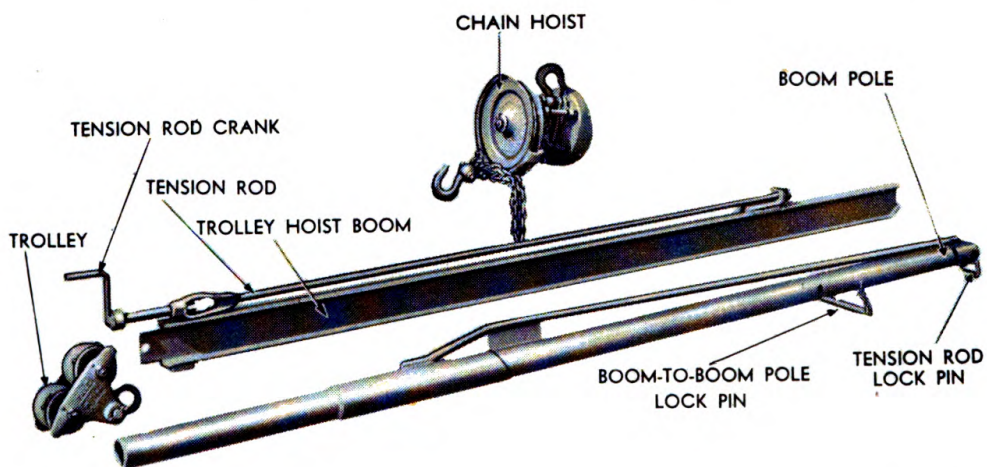


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RA PD 334951

**Figure 12 — Hoist Compartment**



RA PD 334933

**Figure 13 — Trolley Hoist Components**

## VEHICLE STOWAGE AND SPECIAL TOOLS

| Quantity<br>Per Vehicle | Item Name                              | Stowage<br>Location            |
|-------------------------|----------------------------------------|--------------------------------|
| 2.                      | HOSE AND CONNECTORS, air brake<br>8 ft | Fuse box                       |
| 1.                      | CHAIN HOIST, 1/2-ton                   | Hoist compartment              |
| 1.                      | BOOM AND TENSION ROD ASSY.,<br>crane   | Boom and pole com-<br>partment |
| 1.                      | POLE, boom                             | Boom and pole com-<br>partment |

### 7. SPECIAL TOOLS.

a. No special tools are furnished to perform the maintenance operations prescribed. The use of certain tools has been illustrated because of an unusual need or for the reason that the operation can be more easily accomplished through their use. These, or similar, tools can be found in the tool sets listed in SNL G-27, or can easily be made up when needed.

## TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

**PART TWO — OPERATING INSTRUCTIONS**

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**Section IV****4-WHEEL TRAILER CONTROLS AND OPERATION****8. CONTROLS.**

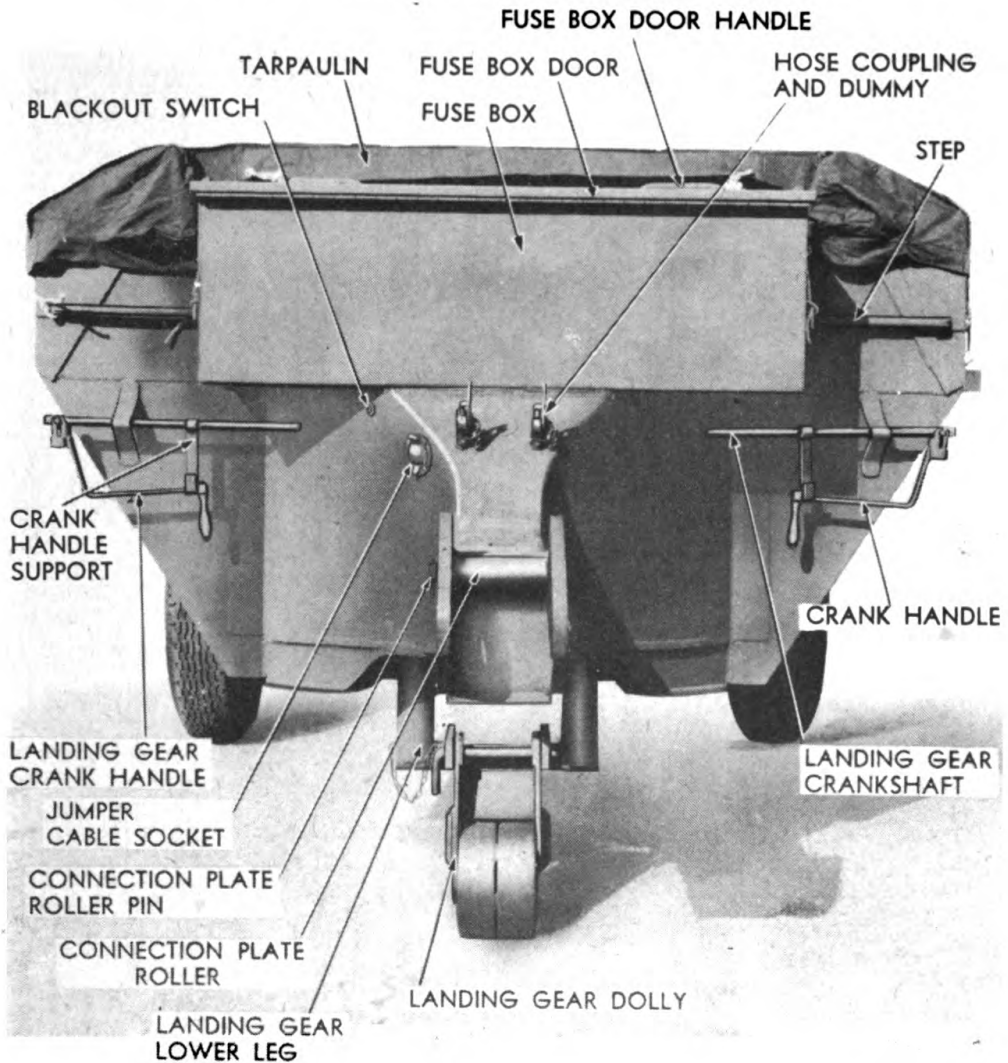
a. **Landing Gear** (fig. 14). The trailer landing gear is hand-operated and is used to support the front of the trailer, when it is not connected to either the limber, or prime mover. The two upper landing gear legs are bracket mounted to the trailer body and hidden by the enclosed nose or A-frame section. A second pair of legs, carrying the hinged landing gear dolly, are retractable, and telescope into the upper legs when not in use. This is accomplished by means of worm gearing operated by the dual hand cranks. The hand cranks have a common crank shaft. If a single crank is to be used, the crank on the opposite side of the vehicle must be placed in position and handle allowed to rotate. Turn the crank on the right side of the vehicle clockwise to raise, and counterclockwise to lower, the landing gear. Fold handles when not in use.

b. **Air Brake Couplings** (figs. 14, 15 and 16). Two air hose couplings and dummy couplings are provided at the front, and two at the rear, of the vehicle. The front couplings connect to the air hoses on the limber or prime mover. Those at the rear attach to air hoses on the limber when using a tandem tow. The dummy couplings are provided to seal any connector not in use. To install dummy coupling, place button against rubber seal with the handle end up (fig. 16). Press button into rubber seal and pull handle down until inner guide strikes stop. Air hose couplings are connected to vehicle couplings in the same manner. Connect one hose to the two couplings marked "SERVICE" and the other to the "EMERGENCY" marked couplings.

c. **Air Supply Shut-off Valves** (fig. 17). Two valves, one at either side toward the rear of the body, supply air to a second trailer, when open, and seal the lines, when in the closed position. When the handle is square with the line, the valve is open. Pull the handle rearward and outward against the stop to close valve.

d. **Emergency-relay Valve and Air Reservoir** (fig. 18). An emergency-relay valve is located on the bulkhead on the left side of the trailer body. It controls the trailer brakes in normal operation and automatically applies the brakes should the trailer break away from the towing vehicle. The air reservoir is bracketed to the side of

## 4-WHEEL TRAILER CONTROLS AND OPERATION



RA PD 334963

**Figure 14 — Ammunition Trailer M23 — Front View**

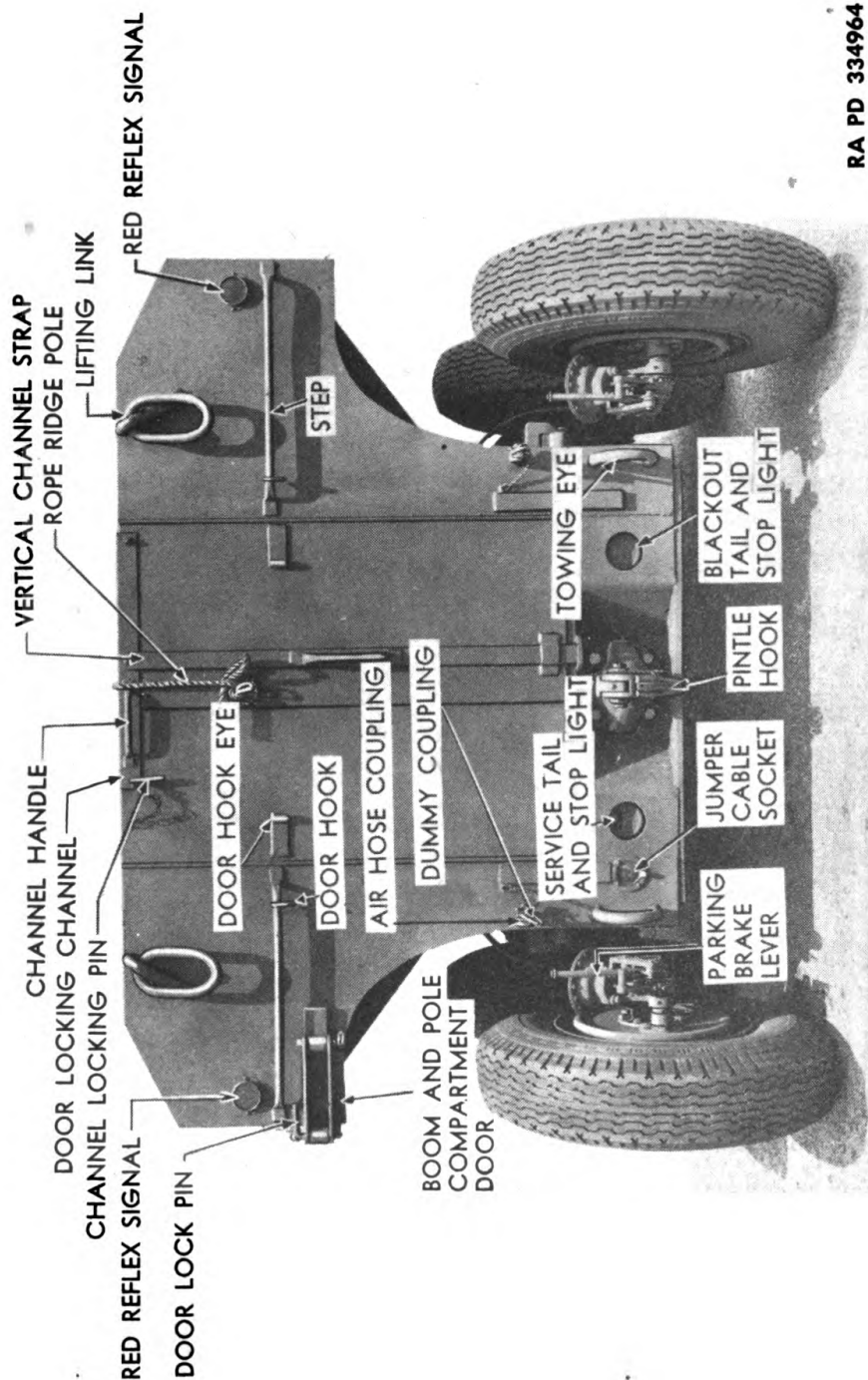
the trailer body, slightly below and ahead of the emergency-relay valve. A drain cock, in the bottom of the tank, provides release for the water or condensation which drains into the tank from the relay valve. The drain cock can also be used to release air from the system.

**e. Brake Air Line Filters (fig. 70).** A filter is installed in each of the two main air lines between the source of supply and the emergency-relay valve. The function of this filter is to trap dirt, condensation or other foreign material which might damage or cause the malfunctioning of the relay valve. A plug is provided in the bottom of each filter for draining.

**f. Jumper Cable and Socket (figs. 11 and 19).** The electrical system on the ammunition trailer is connected to the current supply



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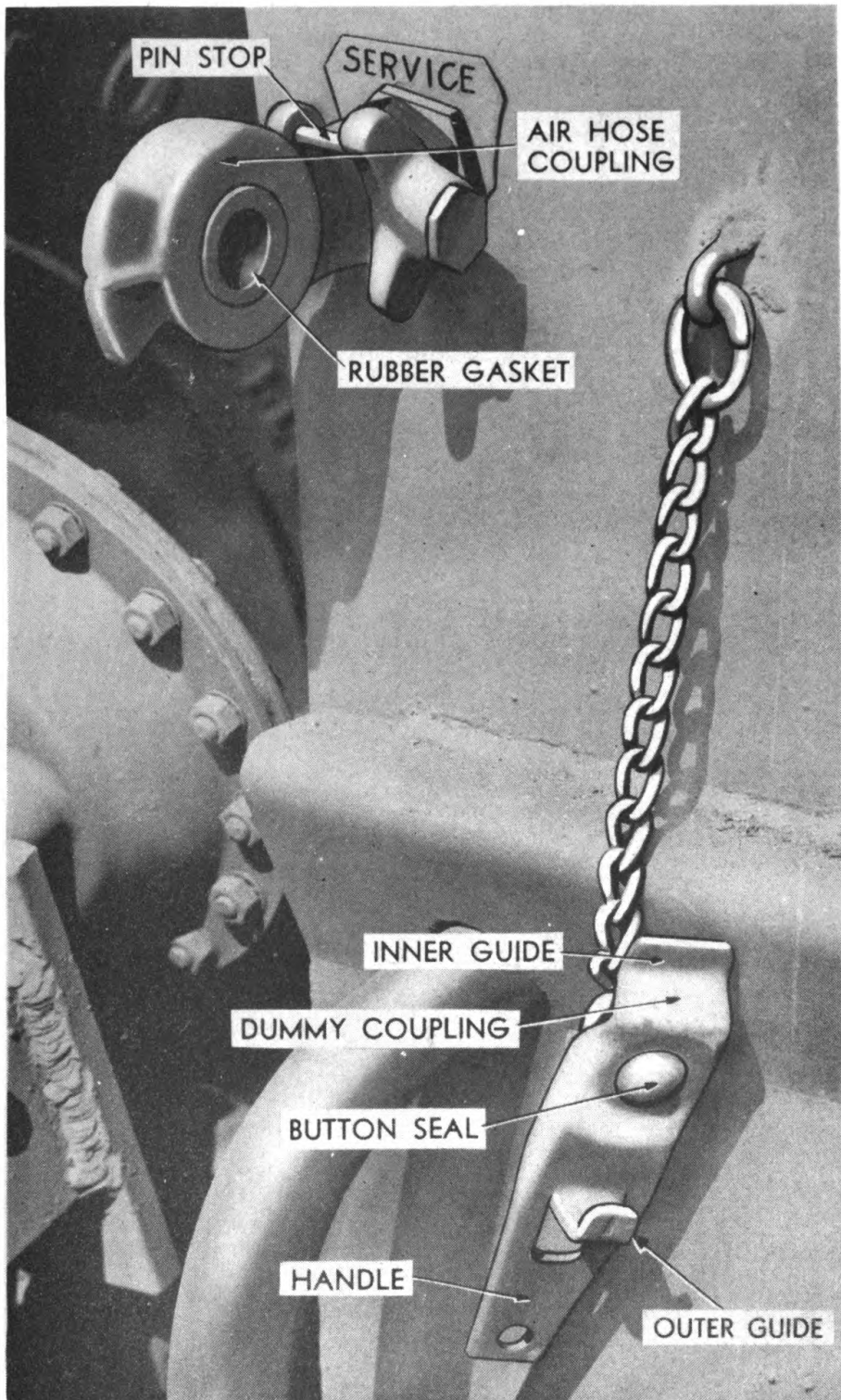


RA PD 334964

Figure 15 — Ammunition Trailer M23 — Rear View



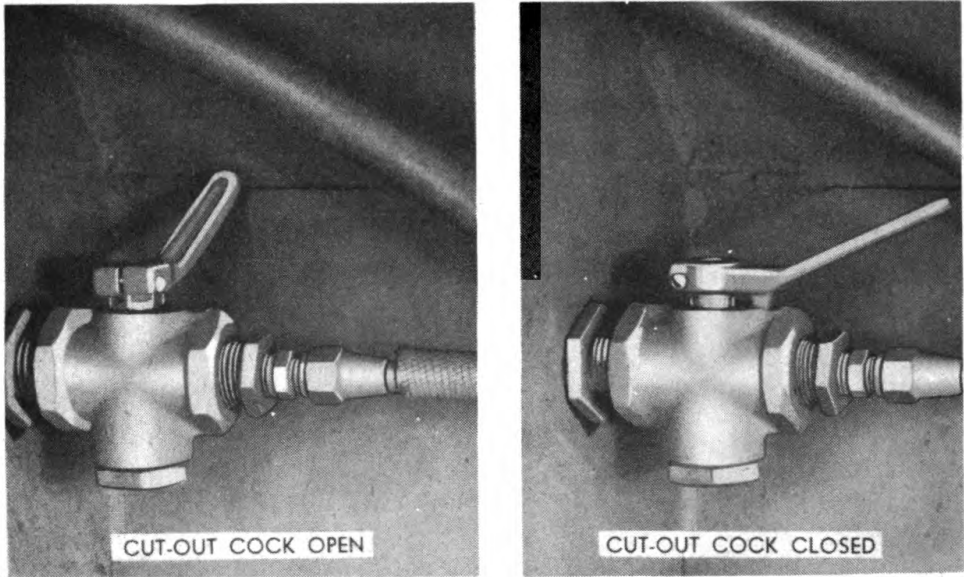
## 4-WHEEL TRAILER CONTROLS AND OPERATION



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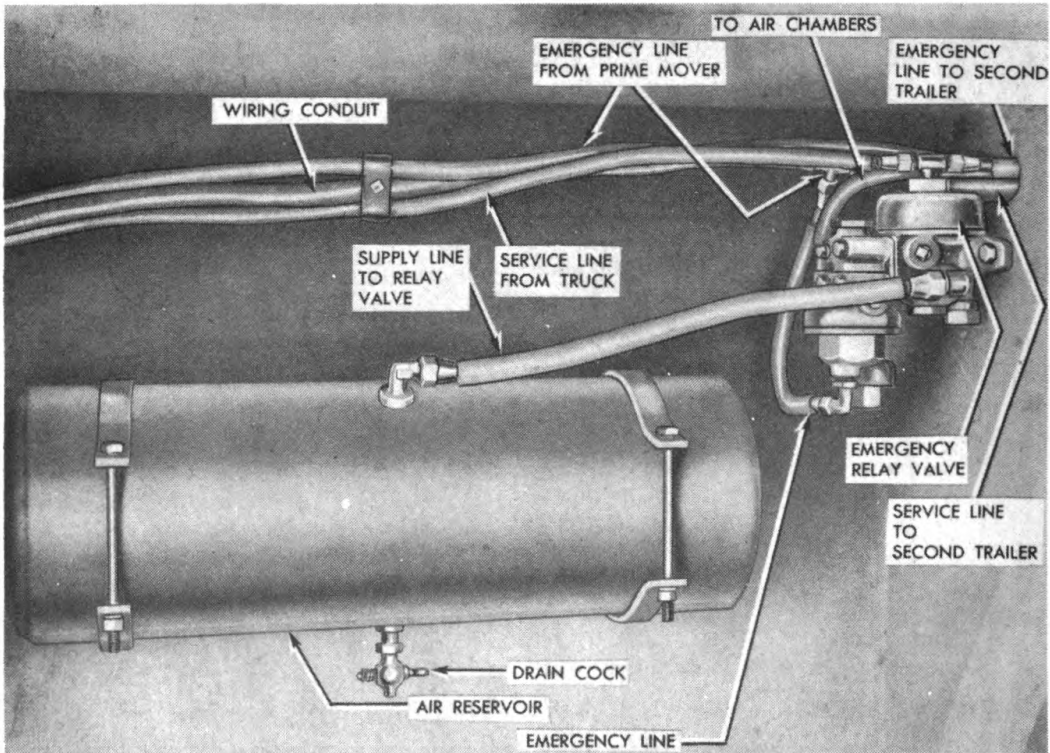
**Figure 16 — Air Hose Coupling and Dummy**

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



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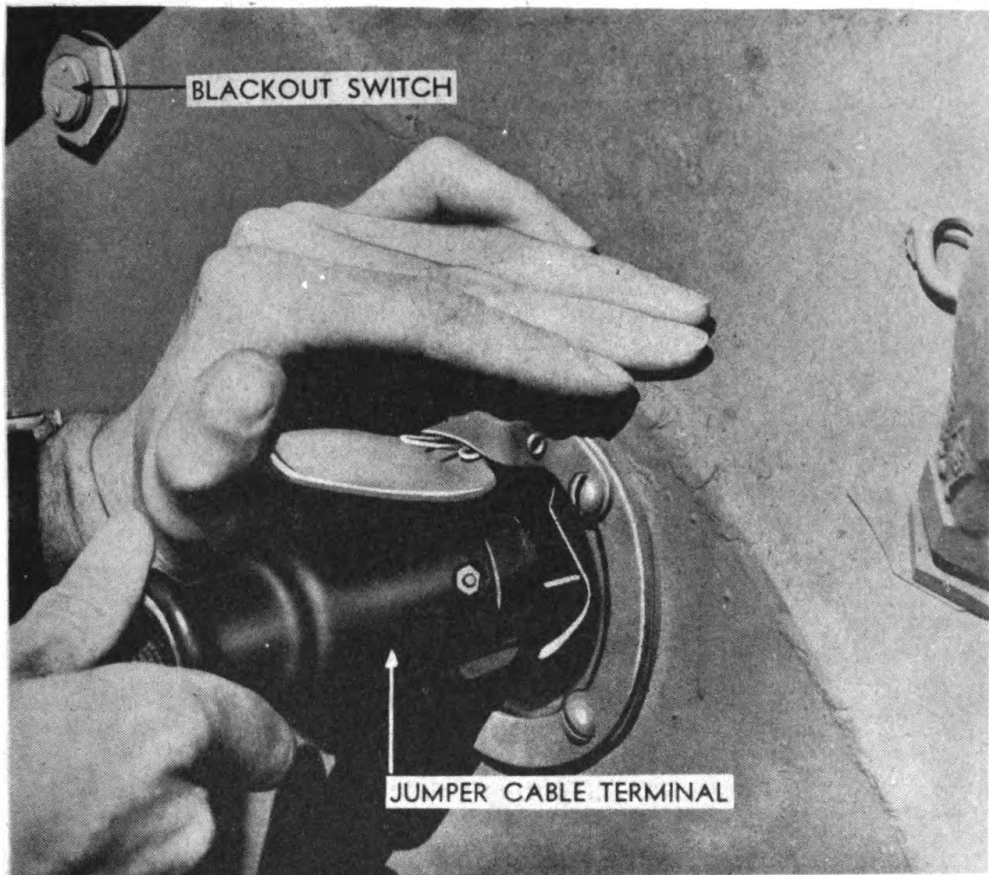
Figure 17 — Air Supply Cut-Out Cock



RA PD 334969

Figure 18 — Brake Air System Controls

## 4-WHEEL TRAILER CONTROLS AND OPERATION



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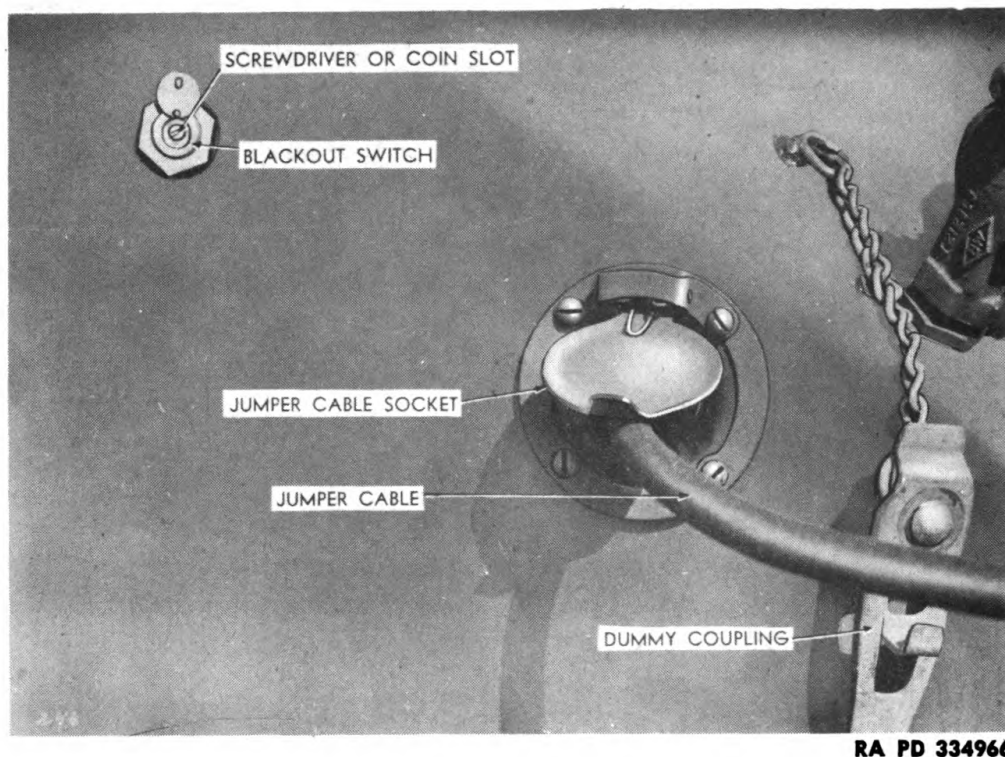
**Figure 19 — Connecting Jumper Cable At Trailer Front Socket**

on the prime mover by means of a jumper cable (fig. 11). A four-connector terminal, at each end of the jumper cable, connects the two electrical systems through their respective jumper cable sockets. The truck and trailer electrical systems must always be connected when the vehicle is in use. To connect cable and socket, lift socket cover, and insert terminal as shown in figure 19.

**g. Blackout Switch (fig 20).** The blackout switch is mounted on the right side of the trailer nose, and is protected by a swivel cover. Use a coin or screwdriver, and turn the slotted shaft of the switch counterclockwise to actuate the blackout tail and stop light, when the tactical situation does not permit use of full lights. Turn the shaft clockwise when the service lights are required.

**h. Reflex Signals.** Two reflex signals, one red and one orange, are provided to mark each side of the vehicle at night (fig. 3). To help avoid collision from the rear at night, a red reflex signal marks each upper rear corner of the body (fig. 15).

## TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 334966

**Figure 20 — Lighting System Controls**

i. **Parking Brake Levers** (fig. 15). A hand lever, bracketed to the rear of each walking beam, applies the brake in its respective wheel. For the purpose of securing parked vehicle, both brakes are always used. Pulling the lever rearward applies the brake. To release the brake, press the button at the top of the lever and be sure the lever is as far forward as it will go.

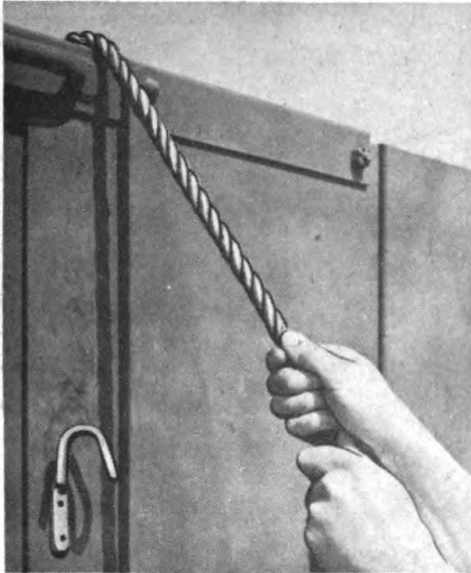
j. **Ridge Pole** (fig. 4). The ridge pole equipment is the rope-and-spring type. A loop, spliced into one end of the rope, attaches to one end of the coil spring, the other end of which is welded at the top center of the body front bulkhead (fig. 4). When in its applied position, the rope is pulled tightly and secured to a clip welded to the outside of the right rear body door. Figure 21 shows the routine steps involved in properly securing the ridge pole.

k. **Compartments and Doors.**

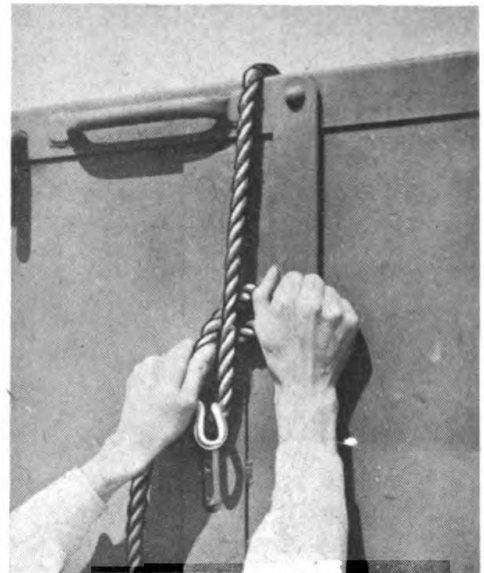
(1) **FUSE BOX** (figs. 14 and 22). The fuse box, welded to the front of the body proper, is used to transport the ammunition fuses and primers, and for stowage of a part of the on-vehicle tools and equipment. A door, hinged at the front, is opened from the rear by lifting on the two door handles. An over-center type lock, at each end of the box, secures the door when closed. To open locks, lift upward, and outward, on the lock handle (fig. 22).



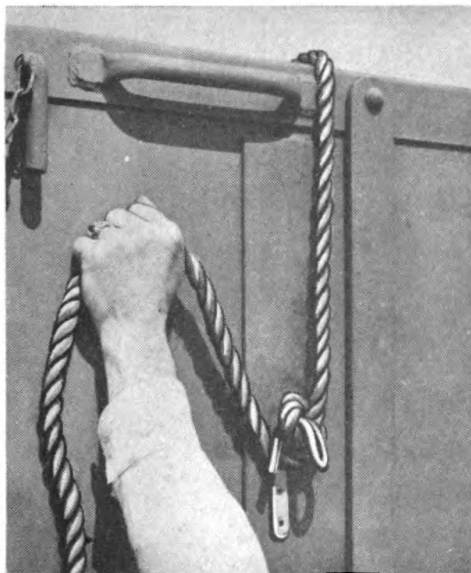
# 4-WHEEL TRAILER CONTROLS AND OPERATION



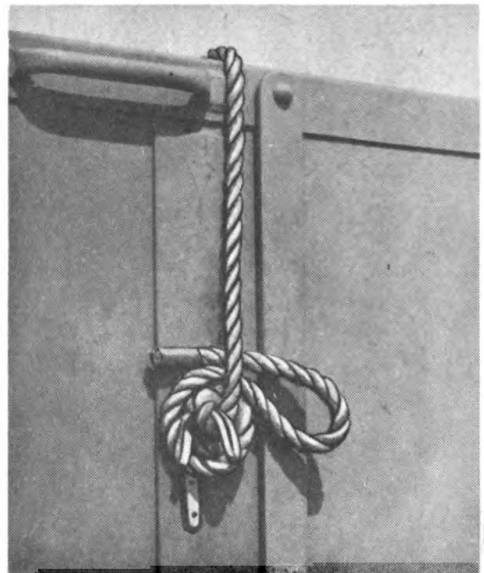
APPLYING TENSION



LOOP AND PULL THROUGH



LOCKING FIRST TURN



SECOND LOCKING TURN AND FINISH  
RA PD 334956

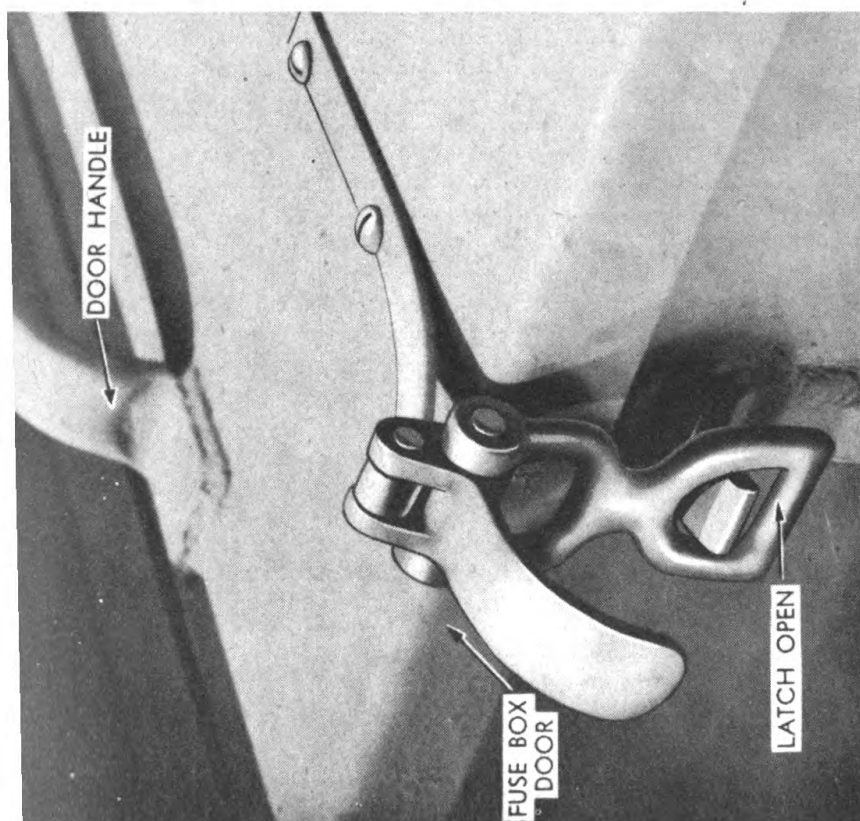
**Figure 21 — Securing Rope Ridge Pole**

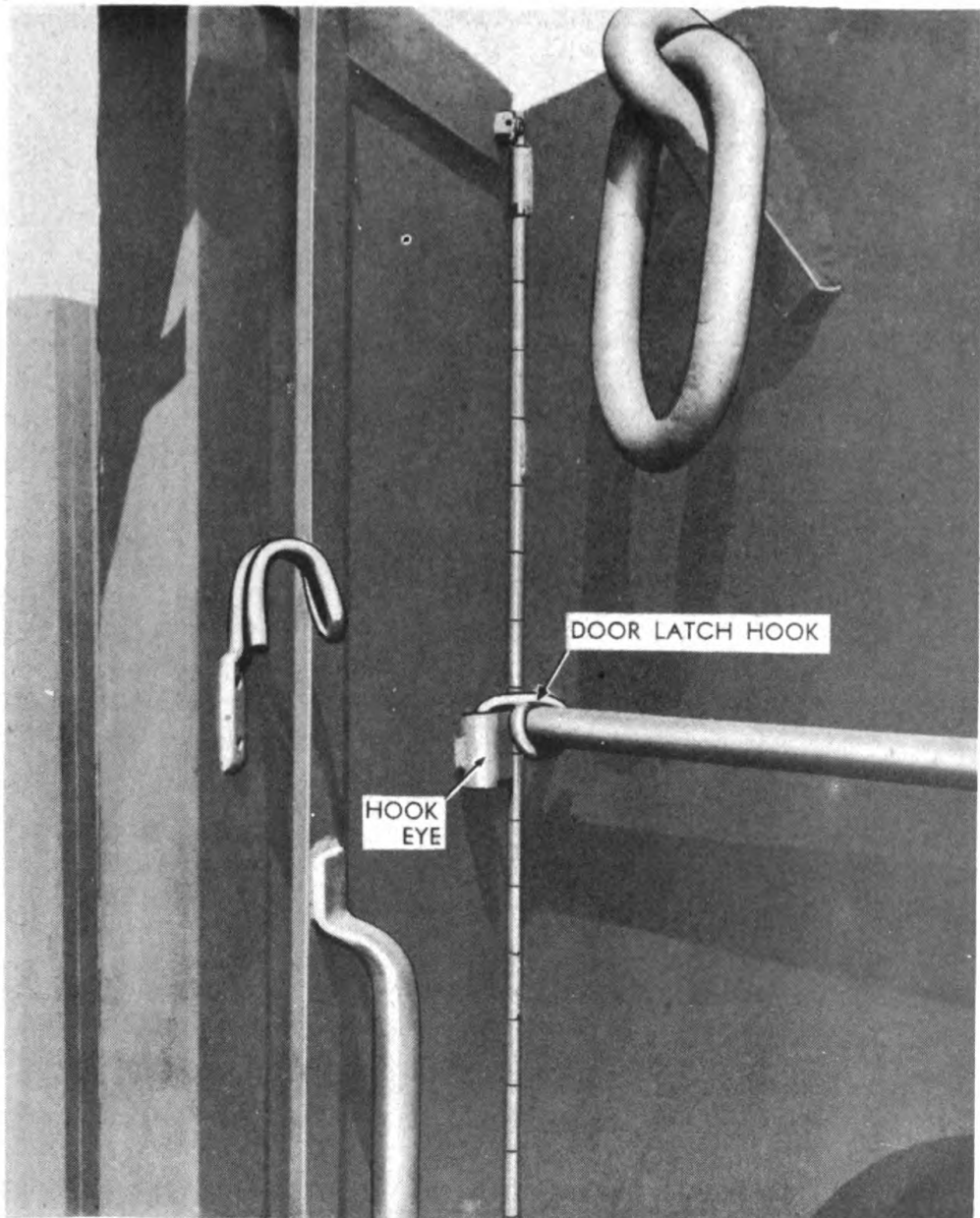
TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 334955

Figure 22 — Fuse Box Door Latch



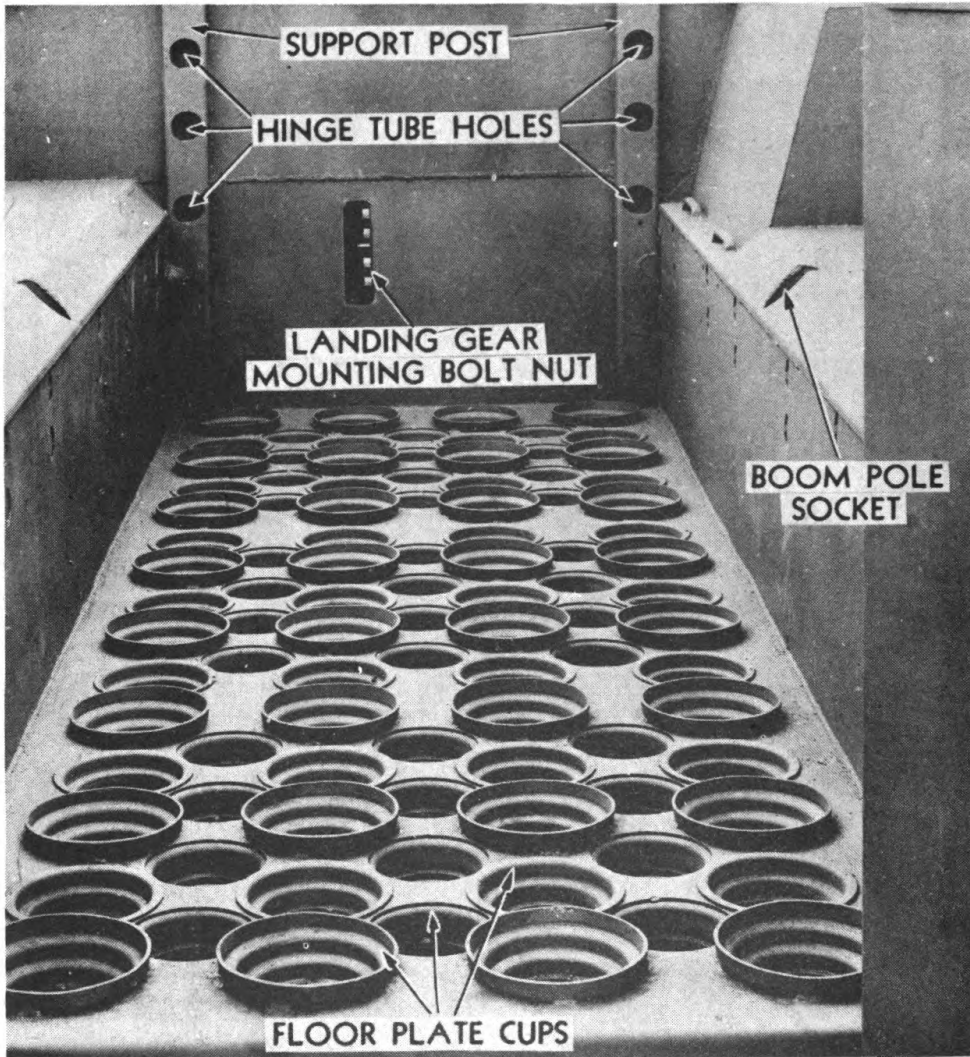
**4-WHEEL TRAILER CONTROLS AND OPERATION**

RA PD 334965.

**Figure 23 — Rear Door Secured In Open Position**

(2) **HOIST COMPARTMENT** (fig. 12). A compartment is provided on the right side of the trailer body for stowing the chain hoist and trolley. The door of the hoist compartment is hinged at the bottom, and opens outward and downward. The spring-loaded latch-type lock is opened by depressing the latch handle.

(3) **BOOM AND POLE COMPARTMENT** (fig. 15). This compartment is built into the left side of the vehicle body. It houses the boom pole and the boom assembly. The door, at the rear of the compart-

**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)**

RA PD 334987

**Figure 24 – Ammunition Well – Racks Removed**

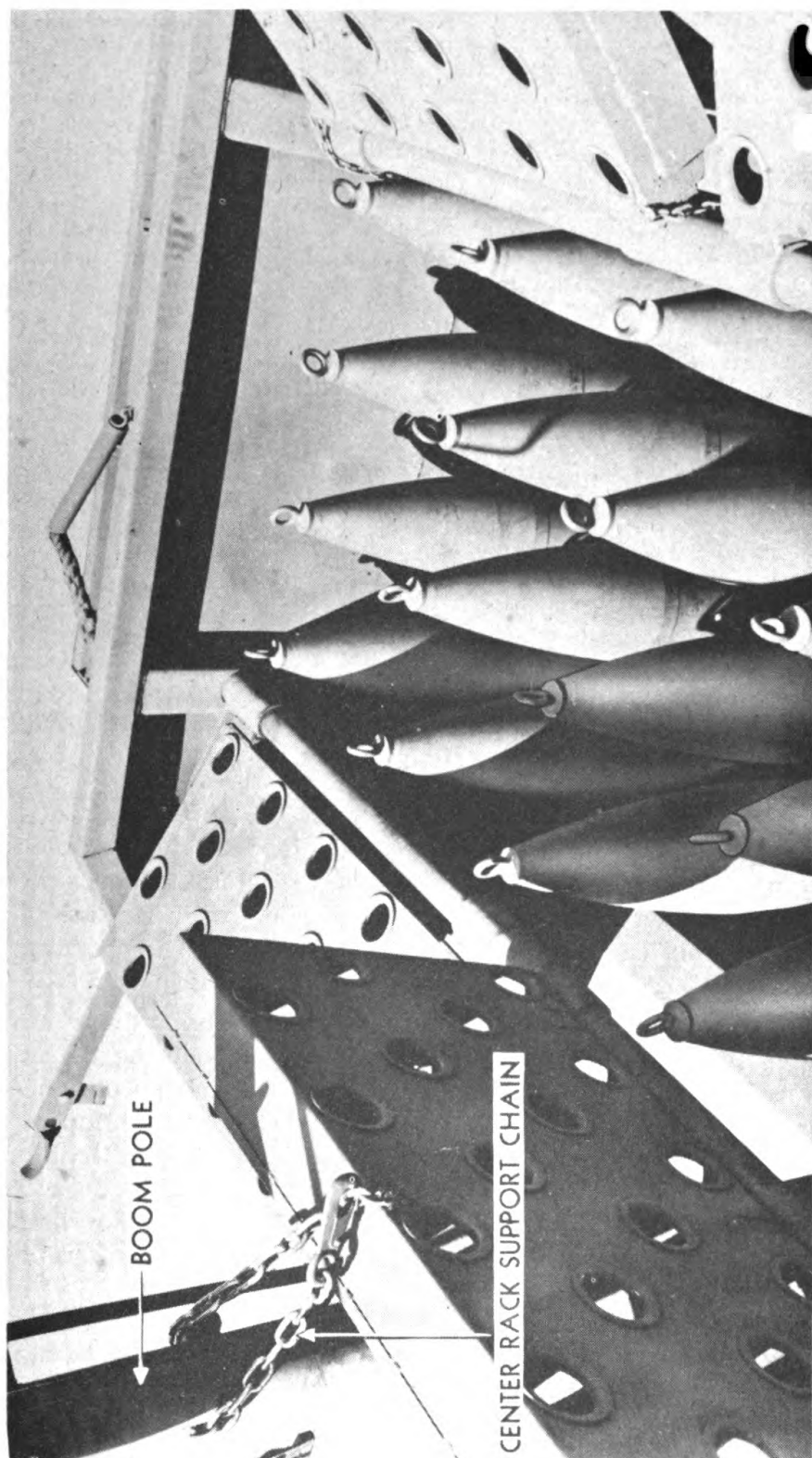
ment (fig. 15), is heavily reinforced to withstand the heavy pounding given it by the boom and boom pole, when the vehicle is used over rough terrain. To open, remove the locking pin.

(4) **BODY DOORS** (figs. 15 and 23). The doors at the rear of the ammunition well are fastened to the door posts by full length piano-type hinges, and open outward. To open doors, remove the channel locking pin and lift the channel by means of the handle on the vertical strap. Besides functioning as a handle mounting, this strap, when in locked position, enters a slot at the door tread to secure the doors at the bottom. A hook and eye (fig. 23) secure the doors when open.

1. **Ammunition Rack** (figs. 4, 24, 25 and 31). The racks, used to support the ammunition rounds being transported, are made up of a cupped floor section and a group of upper hinged sections. The floor

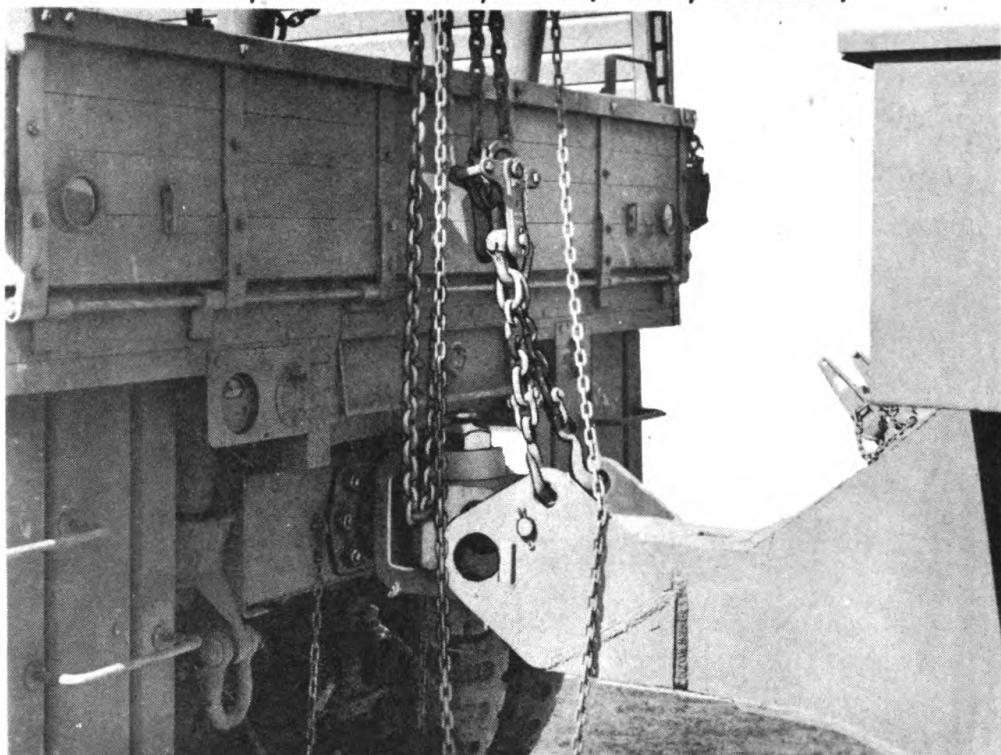


# 4-WHEEL TRAILER CONTROLS AND OPERATION



**Figure 25 — Ammunition Racks — Hinged Sections Open**

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RA PD 334927

**Figure 26 — Using Truck Hoist To Aline Truck and Trailer Towing Connection Holes**

section (fig. 24) is a stamping fitted with the three sizes of cups to fit the bases of the three sizes of shells carried. The whole unit thus formed is welded to the bottom of the ammunition well and serves as the trailer floor. Two steel tubes, one at either side of the ammunition well, extend the full length of the well supporting the six perforated box sections which hinge upon them (fig. 25).

When the trailer is loaded, the opposite box sections hinge toward the center and downward, their perforations thus securing the upper, smaller end of the shell (A and B, fig. 31). An angle iron, on each right-hand section, overlaps the edge of the opposite section of the pair. The two racks are tightened and locked by the cam action of a lever which hinges on the left-hand tube, and is secured by a chain and latch to the right-hand tube (C and D, fig. 31). For detailed instructions on operation of ammunition racks, refer to paragraph 10.

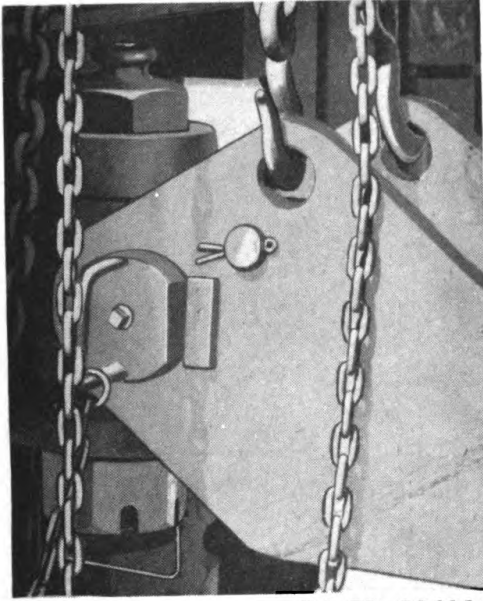
## 9. OPERATION.

a. **Before-operation Service.** Perform the services in paragraph 20 before using the vehicle.

b. **Connecting Trailer to Prime Mover.**

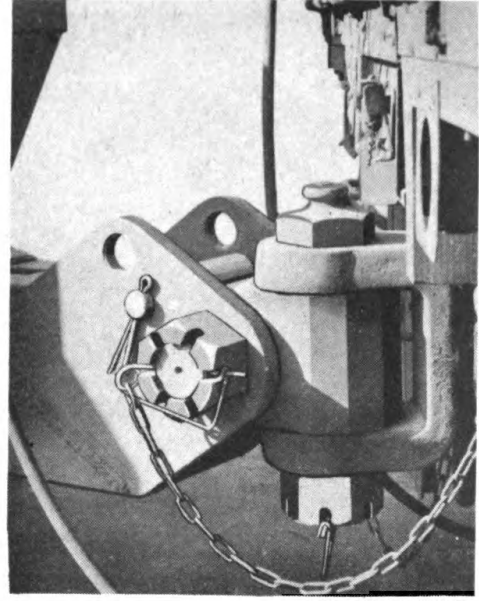
(1) Apply trailer parking brakes by pulling both levers (fig. 15) rearward, as far as possible. Back prime mover truck into position

## 4-WHEEL TRAILER CONTROLS AND OPERATION



RA PD 334914

**Figure 27 —  
Yoke Block Pin Installed**



RA PD 334915

**Figure 28 — Trailer Secured  
To Prime Mover Truck**

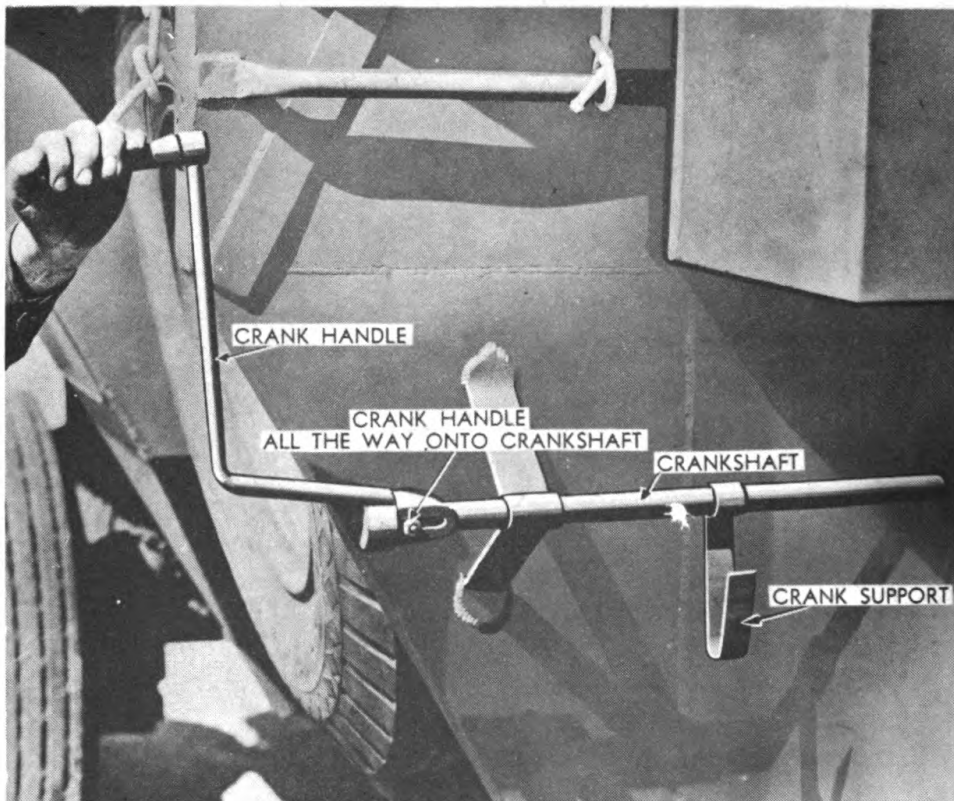
so that truck towing yoke block is alined with the opening between the trailer connection plates, and the yoke block pin is parallel with connection plate roller. Remove yoke block pin, and carefully clean both the pin and pin bore in the yoke block. Carefully back truck until hole in yoke block is, as nearly as possible, in line with hole in trailer connection plates (fig. 26). Attach truck hoist as shown in figure 26. Release trailer parking brakes. Lift front of trailer until attaching holes are in line. *NOTE: It may be necessary to move the truck slightly forward or rearward, with front of trailer raised, to obtain perfect alinement.*

(2) **CONNECT VEHICLES.** Insert yoke block pin through trailer connection plates and yoke block. *NOTE: When the pin is correctly installed, a rectangular piece welded to the trailer connection plate, prevents rotation of the pin (fig. 27).* Install yoke block pin nut, and secure with safety pin (fig. 28). Attach brake air hoses and open air supply cut-out cocks. Attach jumper cable (fig. 19). Raise landing gear dolly and lock in position (fig. 29). Elevate landing gear legs as far as they will go. Fold crank handles and secure in strap brackets. Figure 6 shows trailer correctly attached to prime mover.

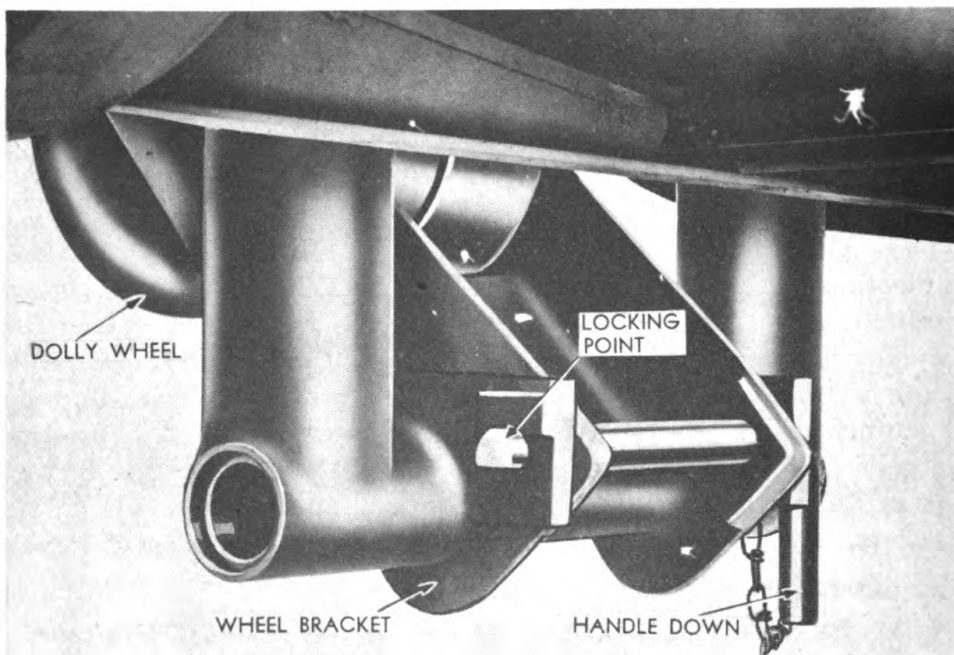
### c. Driving Truck and Trailer.

(1) **BEFORE THE MARCH.** Before moving vehicles, inspect all truck-to-trailer towing connections for condition and security. Be sure that trailer landing gear legs and dolly are fully retracted, and that landing gear crank handles are folded and secured. See that fuse box cover is in position and locked. Be certain that compartment doors

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RAISING LANDING GEAR



DOLLY RAISED AND LOCKED IN POSITION

RA PD 334989

**Figure 29 — Landing Gear Operation**



#### 4-WHEEL TRAILER CONTROLS AND OPERATION

are closed and secured, and that body doors are secured by channel lock pin and strap. If vehicle is loaded, check each of the ammunition rack hold-down chains for proper adjustment, and see that powder load is evenly distributed. See that tarpaulin is properly installed and lashed. See that air cut-out cocks on truck are open. Walk around vehicle and listen for leaks in air hoses. Be sure that both trailer parking brakes are fully released. If tactical situation permits, check truck and trailer lighting system. Using a coin or screwdriver, turn the slotted shaft to the left, or counterclockwise, for black-out lights, and to right, or clockwise, for service lights.

(2) **ON THE MARCH.** Avoid hard jerky starts. They are harmful to the truck, the towing connections, the trailer, and the trailer load. Pick the best spots in the terrain to put the equipment through. Use brakes as sparingly as possible by planning the driving. Know the vehicle, and what can safely be done with it. Try to maintain a nearly constant road speed and, except for the emergency, do not exceed the maximum road speed shown on the identification plate.

(3) **BACKING VEHICLE.** Never reverse the vehicles in close quarters without help on the ground to direct the driver. When backing at an angle, be careful that the angle does not become so acute that the truck is sliding, rather than rolling the trailer wheels. Avoid this condition by stationing one guide at the point where the vehicles are connected.

**d. Stopping Truck and Trailer.** Be conscious of the total weight of the vehicles and load. As far as possible, plan stops far enough in advance so that the deceleration can be gradual, and the resultant wear and stresses kept to the minimum. Signal to the drivers behind so they may stop safely, or be prepared to pass. Before leaving the vehicles, apply the truck and trailer parking brakes, and note their ability to hold the vehicles.

**e. Disconnecting Trailer From Prime Mover Truck. CAUTION:** *Before disconnecting trailer from prime mover truck, make certain that both vehicles are so alined that the truck can be driven straight ahead when disconnected. This will avoid the otherwise severe cramping and binding of the prime mover towing yoke between trailer connection plates.* Apply trailer parking brakes. Shut off air supply lines at truck. Disconnect the two air brake hoses at trailer couplings and close the couplings with the dummy couplings. Disconnect the electric jumper cable and stow it correctly in the trailer. Remove safety pin and nut from yoke block pin. Lower trailer landing gear until the dolly can be dropped and secured with locking pin (fig. 30). Continue lowering the landing gear until load is removed from truck towing yoke to the extent that the yoke block pin can be moved freely. Pull out the pin. Move the truck forward enough to separate the

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

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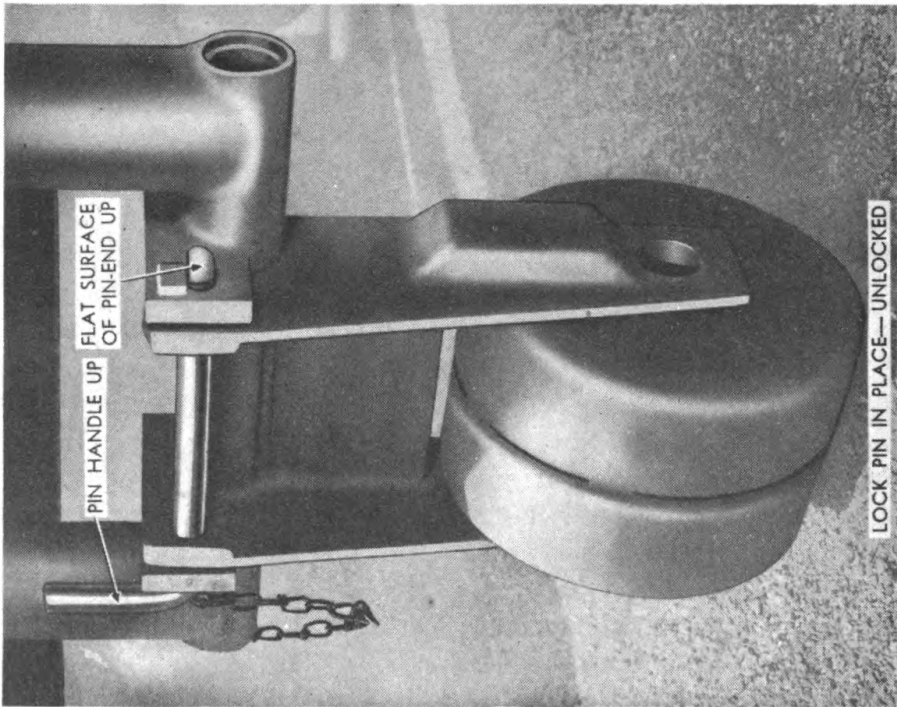
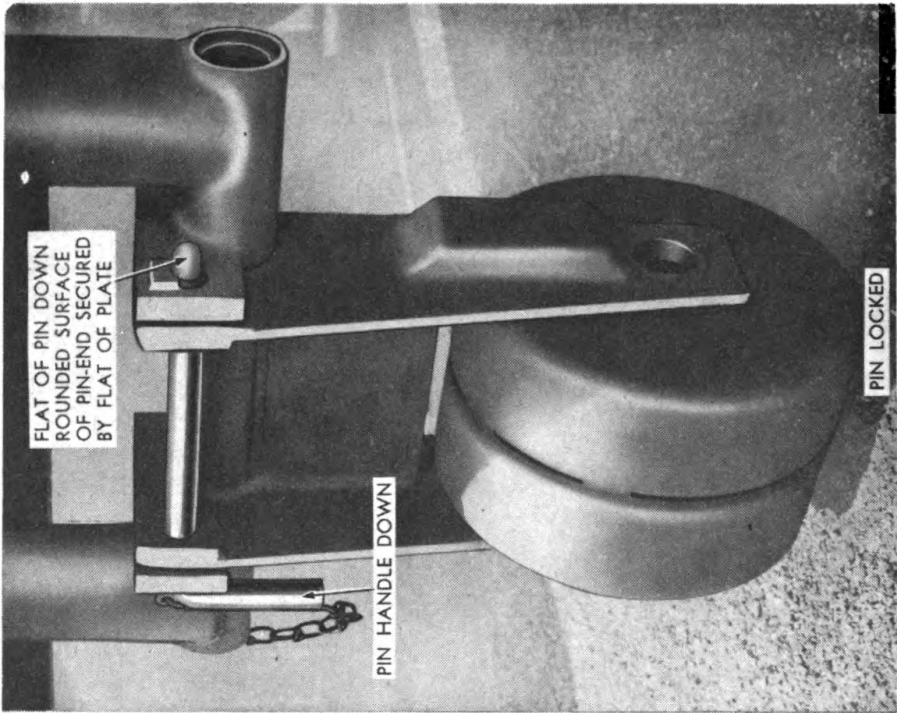
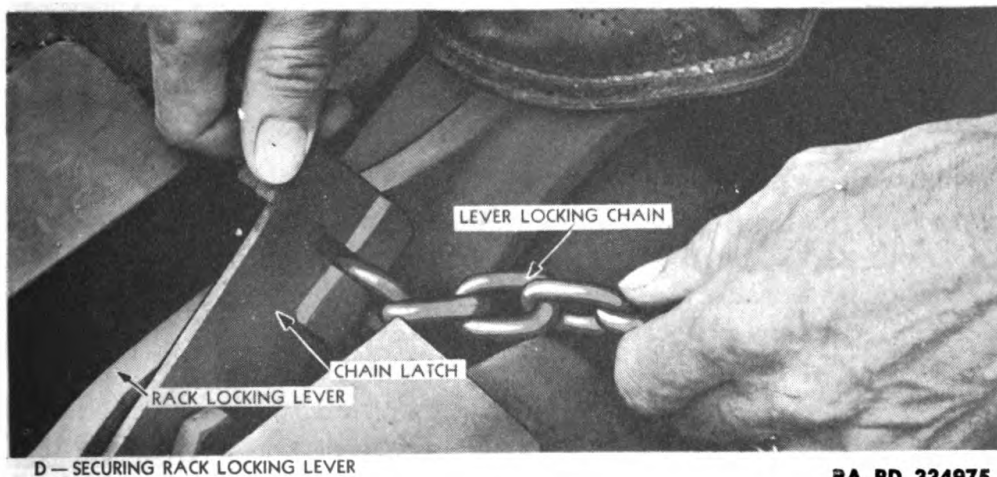
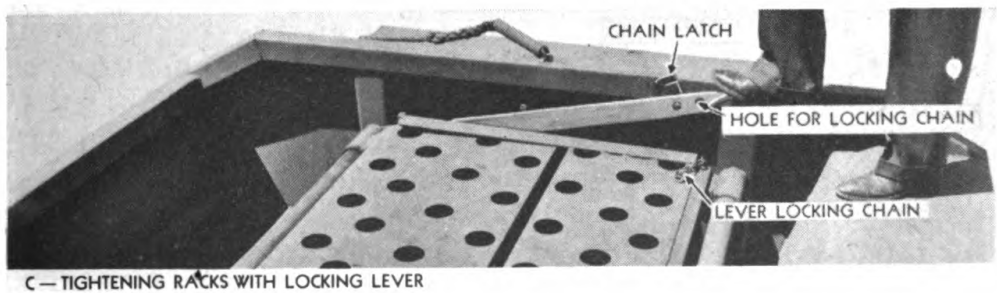
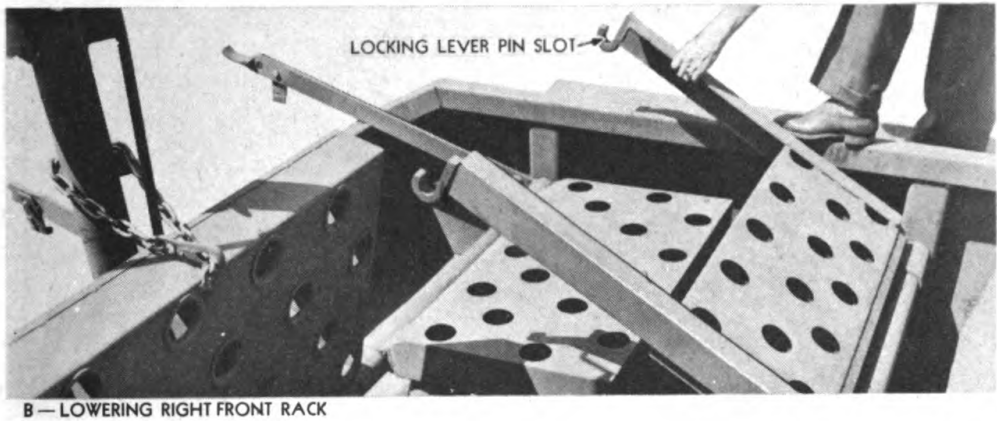
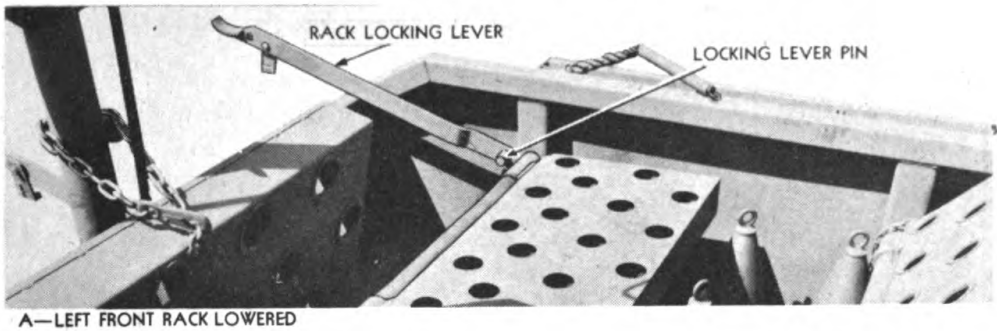


Figure 30 — Securing Landing Gear Dolly

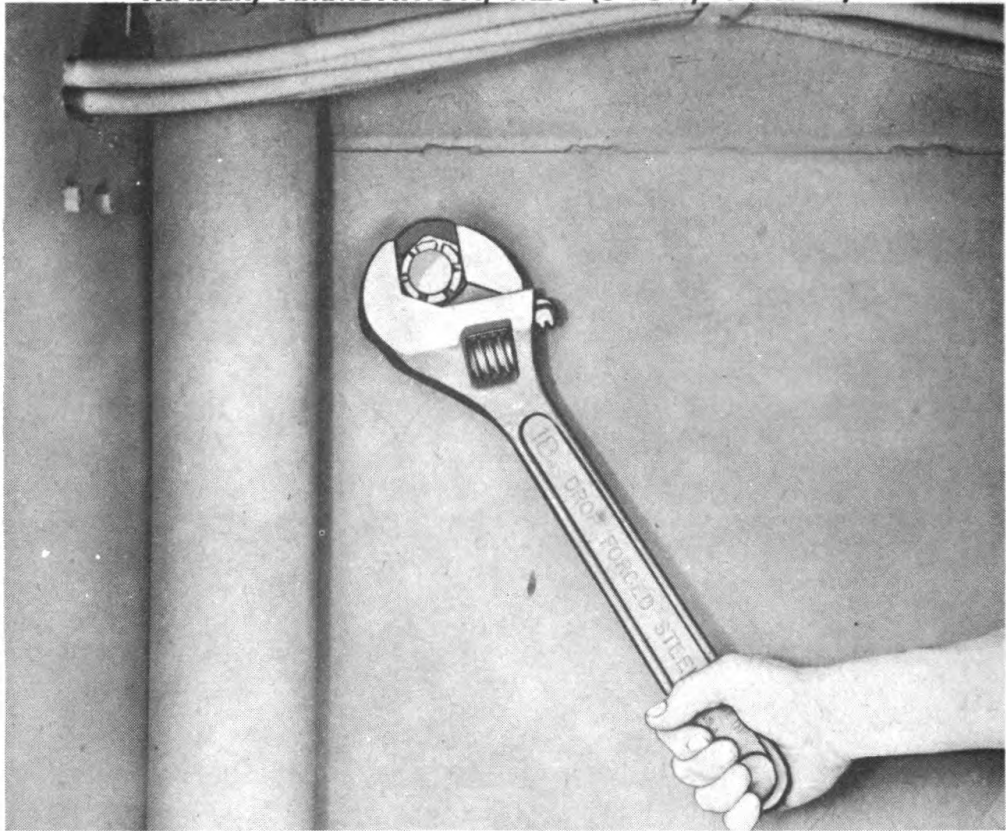
## 4-WHEEL TRAILER CONTROLS AND OPERATION



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**Figure 31 — Ammunition Rack Operation**

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 334977

**Figure 32 — Loosening Hinge Tube Center Post Bolt Nut**

towing yoke from the trailer connection plates. Install the pin in the yoke block on the prime mover truck. Install the nut and safety pin.

**10. OPERATION OF AMMUNITION RACKS (figs. 25 and 31).**

a. **General.** The ammunition rack sections are supported in the center, only when the vehicle is loaded. When no load is carried, the sections hinge downward and ride suspended from their respective hinge tubes. Before loading, be certain that all dirt, gravel, or other foreign material has been removed from floor plate cups.

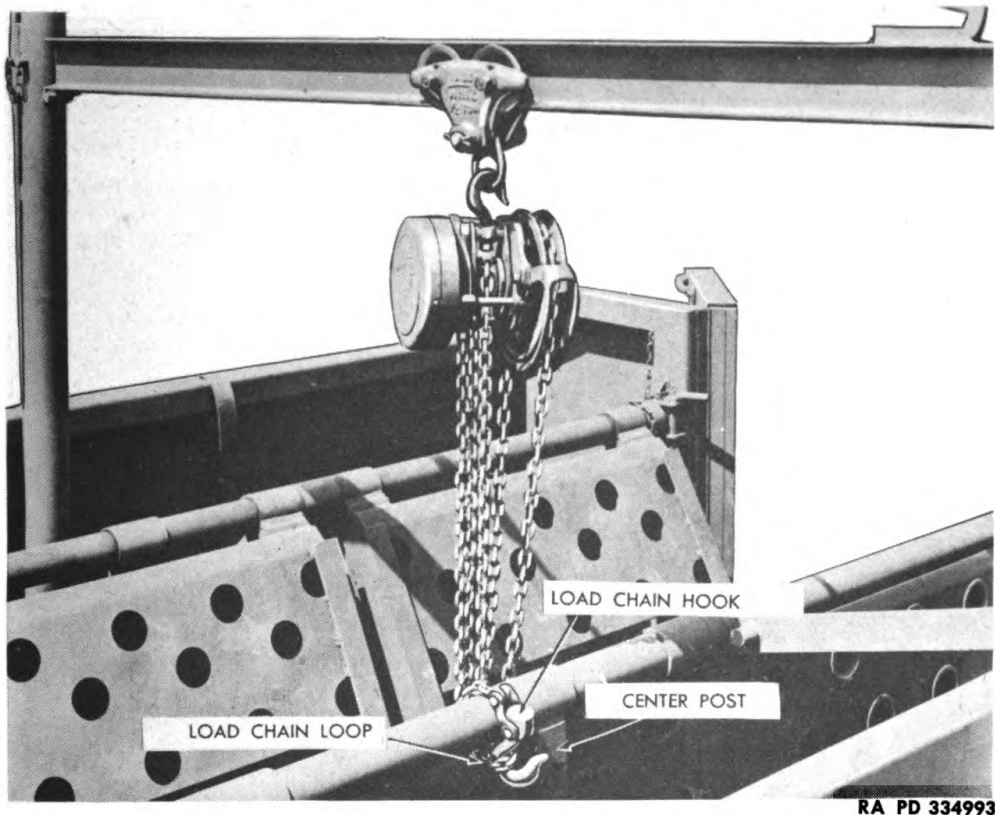
b. **Closing Racks (fig. 31).**

(1) **NOTE:** *The following instructions cover a vehicle, loaded and positioned as shown in figure 25, with the center rack supported by a chain around the boom pole. See that ammunition rounds are setting squarely in their respective cups.*

(2) Lift left front section over, and down onto the shells so that the perforations in the rack fit snugly around the necks of the shells (A, fig. 31). If interference exists, re-check the positioning of the shells. Turn or move, as necessary, those shells that are not properly alined. **NOTE:** *Dirt, gravel, or other foreign material in a floor plate*



## 4-WHEEL TRAILER CONTROLS AND OPERATION



**Figure 33 – Chain Hoist Attached To Hinge Tube**

*cup will cause the shell to cock sufficiently to prevent the closing of the rack. Never force the rack down until assured that floor plate cups are clean.*

(3) Lower right front rack to approximately the point shown at B, figure 31 and allow it to drop over shells and the left front rack. Stand on the long overlapping arm of the rack just dropped, and jar both racks into the best possible alinement.

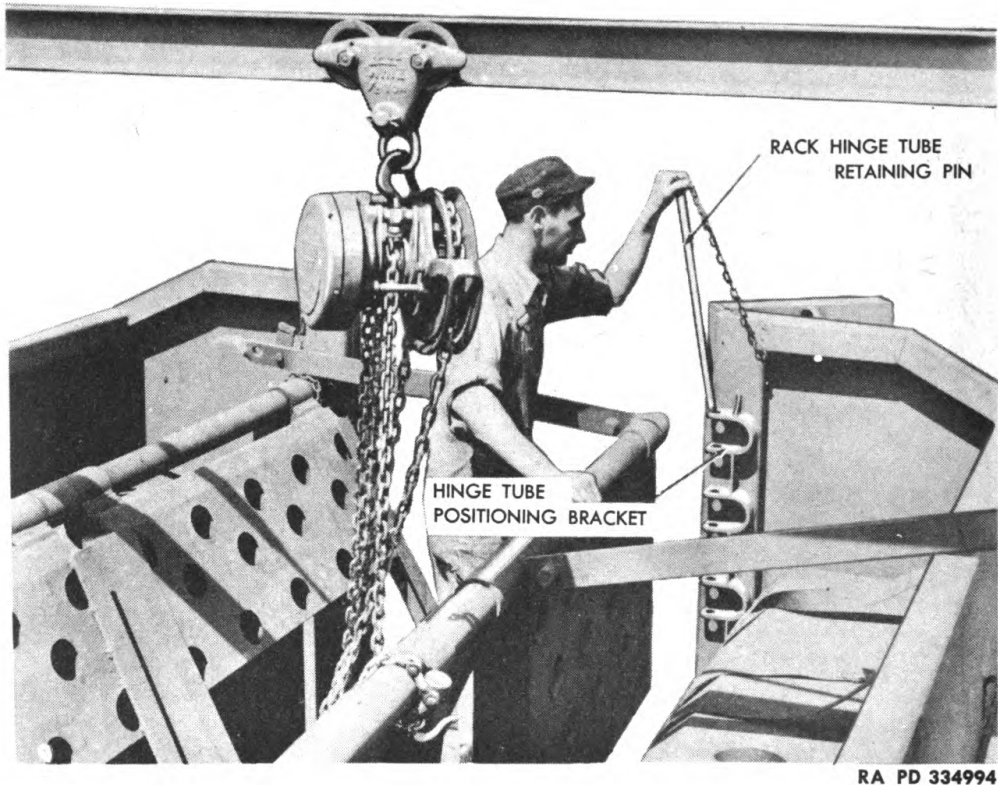
(4) Pull rack locking lever over and force down against right-hand hinge tube (fig. 31, C). With locking lever held down, pull lever locking chain through hole in lever until tight and secure with chain latch as in D, figure 31. **NOTE:** *Always insert the chain from the side of the locking lever opposite the side bearing the latch. In this way, the pull of the chain, when secured, is against the latch braced by the locking lever.*

(5) Close all racks in manner described above. Disassemble and stow trolley hoist (par. 15). If no propelling charges are to be loaded, close and secure doors. Install and secure ridge pole (par. 8).

**c. Opening Racks.**

(1) **NOTE:** *Before opening racks for unloading, or positioning for loading, install trolley hoist (par. 15).*

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RA PD 334994

**Figure 34 — Swinging Hinge Tube and Rack Assembly Away From Rear Support Bracket**

(2) Unlatch chains securing the two center rack locking levers. Raise levers, and rest them against left side of trailer body. If trolley hoist is installed in the left-hand socket, hinge right section of center rack backward against trailer body. Raise left-hand center section and secure to boom pole as in figure 25. Unlatch other racks and lift upward and outward until all rest against sides of trailer body.

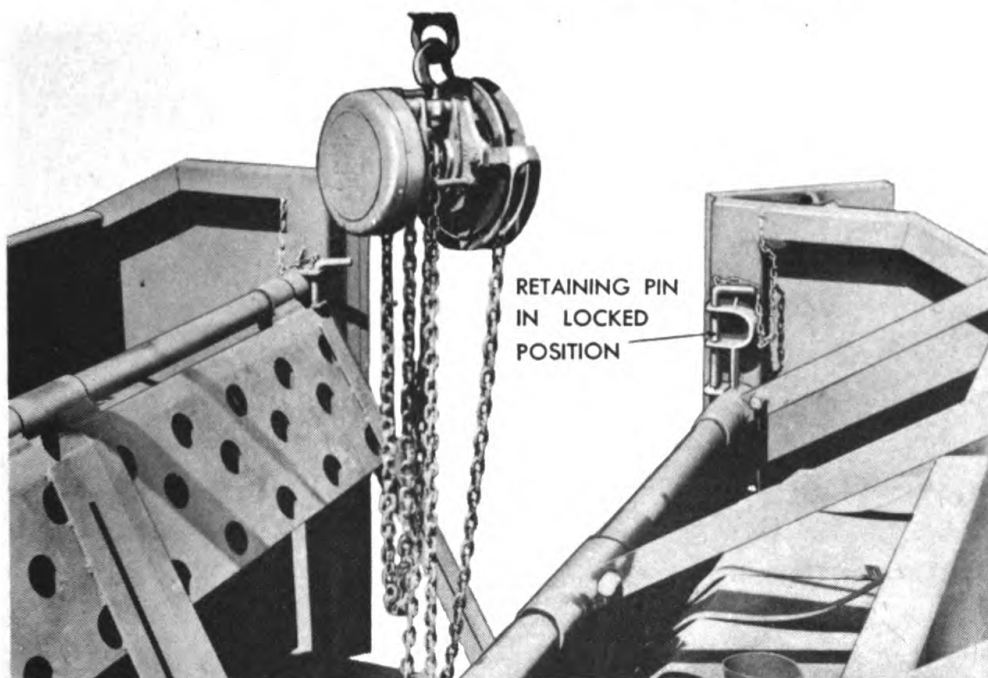
**d. Relocating Hinge Tube and Racks.**

(1) Hinge the six perforated rack sections toward the center of the ammunition well. Rest the long side angles of the right-hand rack sections on the floor plate. The left-hand sections will hang straight down from the hinge tube (fig. 33).

(2) Have the hinge tube center post bolt head held from the inside, and remove the cotter pin, nut, and flat washer (fig. 32).

(3) Install the trolley hoist (par. 15). Swing boom and position the chain hoist over the center of the tube and rack assembly to be moved. Loop the hoist load chain about 16 inches from lifting hook, and insert loop into space between rack section and hinge tube. Place hook end of chain over hinge tube and engage loop with lifting

## 4-WHEEL TRAILER CONTROLS AND OPERATION



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**Figure 35 — Left Hinge Tube and Rack Secured In New Location**

hook (fig. 33). **NOTE:** See that the load chain, thus attached, is against the hinge tube center post before operating the hoist. Lift the tube and rack just enough to be assured that the weight of the assembly is supported by the chain hoist.

(4) Remove center post bolt. Lift out hinge tube retaining pin. Hinge rear locking lever of rear rack over to rest on opposite hinge tube. Pull rear of tube toward center of well and out of support bracket. Pull whole assembly rearward until front end of tube is clear of the whole in front support post (fig. 34).

(5) Raise or lower assembly to the desired position. Enter front end of tube into hole in support post (fig. 24) and push in all the way. Slide rear end of tube into corresponding slot of rear support bracket, and install retaining pin (fig. 35). Swing rear rack locking lever to rest on left side of body.

(6) Install center post bolt, from inside of body, and hold bolt head while second man installs flat washer, nut, and cotter pin. Disconnect load chain.

(7) To relocate the opposite rack, follow the procedure outlined above in subparagraph d (2) through d (6) **NOTE:** The trolley hoist will handle either hinge tube and rack assembly from either boom pole socket. Figures 32, 33, 34 and 35 illustrate the procedure involved in relocating the left hinge tube and rack assembly from the 240mm shell position to the 8-inch shell position.

**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)**

**Section V**

**6-WHEEL TRAILER CONTROLS AND OPERATION**

**11. GENERAL.**

a. When the ammunition trailer is used with the heavy carriage limber M5, it becomes a six-wheel trailer (fig. 5). With the front of the trailer supported by the limber, the combined vehicle may be towed by any heavy prime mover equipped with a satisfactory towing pintle. As a six-wheeled trailer, it may also be towed behind another ammunition trailer.

**12. CONTROLS.**

a. **Trailer.** Controls are the same when vehicle is used as a four-wheeled, as when used as a six-wheeled trailer. Refer to paragraph 8.

b. **Limber.**

(1) **LUNETTE** (fig. 7). A lunette eye is formed on the end of a spring-loaded shaft housed at the front of the limber A-frame. The lunette, when locked in the pintle hook of the towing vehicle, pulls the total towed load.

(2) **AIR HOSES AND CONNECTORS** (fig. 7). Two air hoses are bracketed to the limber A-frame for the purpose of connecting the air supply of the prime mover to the brake air system on the trailer. Connectors are provided at both ends of both air hoses.

(3) **TOWING BRACKET AND EYE BOLT** (figs. 7 and 8). The trailer is attached to the limber by means of a heavy cast steel towing bracket (fig. 7). The bracket is supported by a horizontal rocker pin locked in a vertical spindle which rotates on bronze bushings housed in the center of the limber axle. When the limber is detached from the trailer, the towing bracket is maintained in an upright position by an eye bolt, pinned to the front of the towing bracket and locked in a bracket on the crossmember of the limber A-frame. When attached to the trailer, the eye bolt attaches to the rear of the towing bracket extending up through the trailer nose section or A-frame and, by means of the eye bolt winged nuts, locks the front of the trailer down to the rear of the towing bracket (fig. 38, D).

**13. OPERATION.**

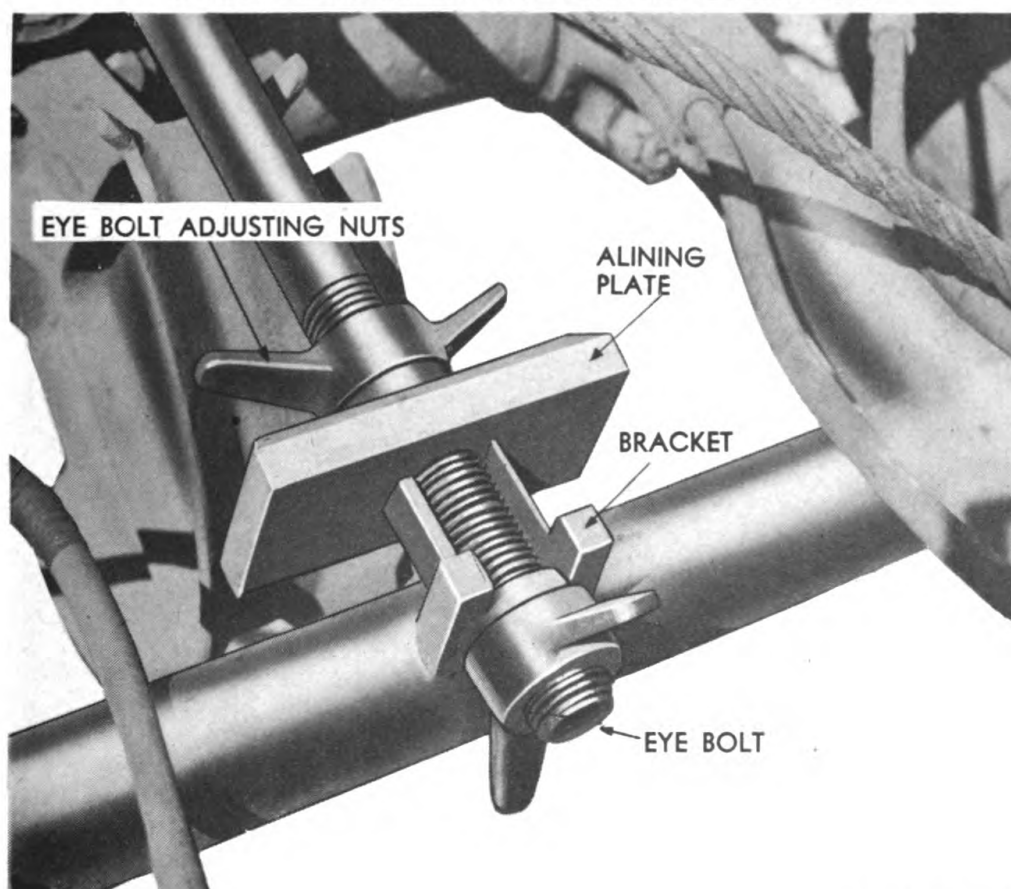
a. **Before-operation Service.** Perform the services in paragraph 20 before using the vehicle.

b. **Connecting Limber to Trailer.**

(1) Apply trailer parking brakes by pulling hand levers (fig. 15) all the way back. With eye bolt in position, in front of limber towing



## 6-WHEEL TRAILER CONTROLS AND OPERATION



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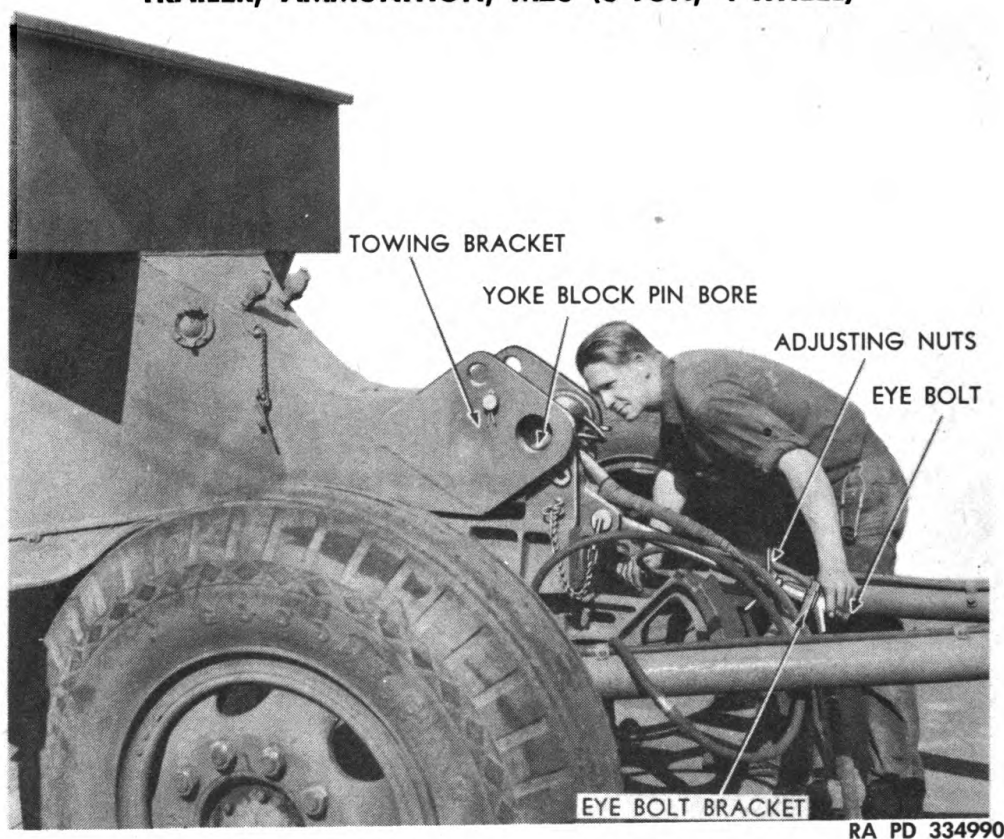
**Figure 36 — Eye Bolt Secured in Limber "A" Frame Bracket**

bracket (fig. 7), adjust winged nuts so that eye bolt holds the bracket approximately vertical. Remove towing bracket yoke pin. Clean bracket yoke pin, bore of yoke, and bearing surfaces in holes in trailer A-frame connection plate. Lubricate as specified in Lubrication Order.

(2) Position limber, so that towing bracket yoke is in line with opening between trailer connection plates, and back limber carefully into position until final attaching adjustments can be made. Use the trailer landing gear, and elevate the front of the trailer until the upper rear surface of the limber bracket will clear the lower surface of the trailer A-frame. Back limber into A-frame opening until hole in limber bracket is in line vertically with holes in trailer connection plate (fig. 37). Lower trailer until holes are alined as well as is possible. Use the eye bolt adjusting nuts to move hole in limber bracket towing yoke forward, or rearward, until yoke pin hole is alined with holes in trailer connection plates (fig. 37).

(3) Install yoke block pin. Secure pin with nut and safety pin (A, fig. 38). Apply prime mover parking brakes. Loosen eye bolt

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RA PD 334990

**Figure 37 — Adjusting Length Of Eye Bolt To Position Towing Bracket**

winged nuts. Unlock and remove eye bolt lock pin (fig. 39), and remove eye bolt. **CAUTION:** *The towing bracket is a very heavy assembly, and can be dangerous to personnel if its movement is not controlled. See that the yoke block pin is in place before releasing the eye bolt.* Install link of free end of sling in eye bolt boss on front of bracket as in figure 5. Install, and lock, eye bolt lock pin.

(4) Remove winged nuts and alining block from eye bolt. Lower eye of eye bolt through rectangular hole in A-frame (B-fig. 38), until eye can be alined between lock pin holes at rear of limber towing bracket. Install and lock the lock pin. Install alining block with chamfered edge down to aline with mating surface on trailer. Install both winged nuts with wings up, or away from alining block. Screw lower winged nut down against alining block, and tap wings with a hammer to tighten. Screw upper winged nut down into lower nut, and tap tight to lock. **NOTE:** *If only one man is available, place the alining plate and winged nuts onto the eye bolt before the eye bolt is installed through the trailer frame. Use the lower adjusting nut to aline the eye of the eye bolt with the holes in the bracket bosses as shown in C, Figure 38. Install and lock locking pin (C and D, fig. 38).* D, figure 38 shows trailer correctly locked to limber towing bracket. Attach limber air lines to couplings on front of trailer. Attach front ends

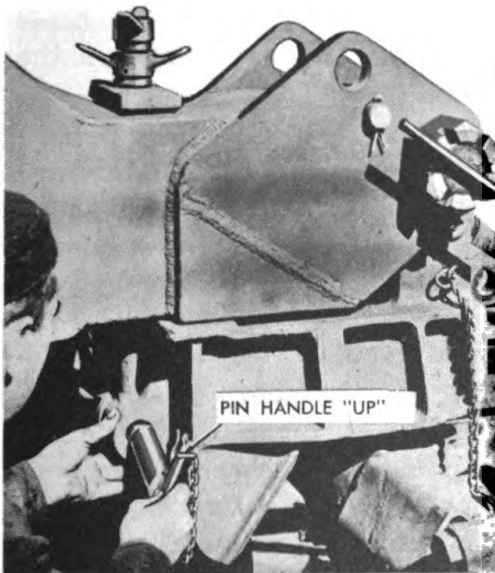
# 6-WHEEL TRAILER CONTROLS AND OPERATION



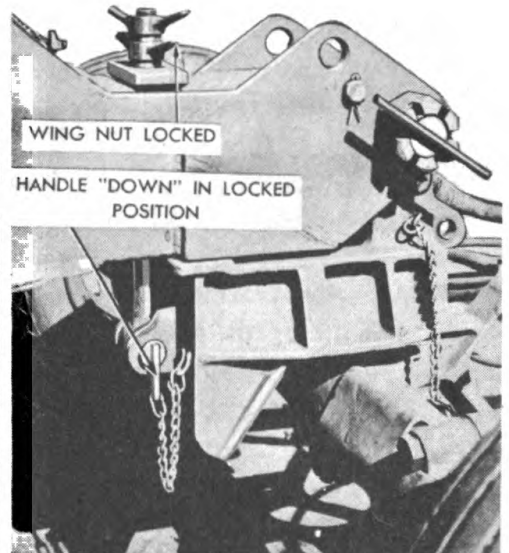
A—REMOVING EYE BOLT



B—LOWERING EYE BOLT  
THROUGH TRAILER "A" FRAME



C—INSTALLING EYE BOLT LOCKING PIN



D—TRAILER SECURED TO LIMBER

RA PD 334909

Figure 38 — Securing Limber To Trailer

## TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

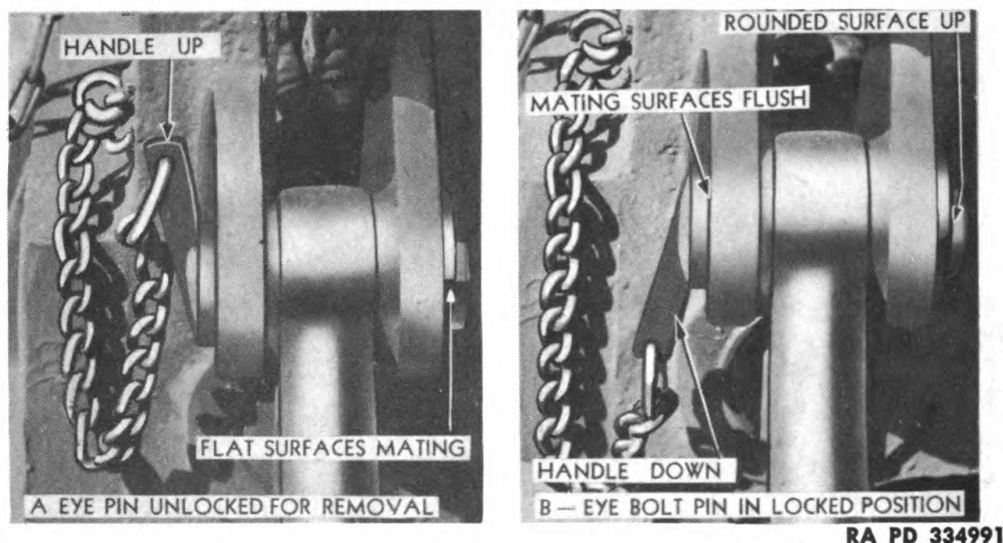


Figure 39 — Eye Bolt Lock Pin

of these lines to couplings on prime mover, and open air valves on prime mover. Connect jumper cable to prime mover and trailer sockets. Raise trailer landing gear to traveling position (par. 9).

**c. Driving Truck and Six-wheeled Trailer.**

(1) **BEFORE THE MARCH.** Inspect trailer as recommended in paragraph 9. In addition, check limber-to-trailer towing bracket connections and safety devices. Be sure that lunette eye is correctly locked in pintle hook of towing vehicle. See that limber air hoses are serviceable, and that the connectors are properly locked in the couplings on the prime mover and on the trailer.

(2) **ON THE MARCH.** The same good driving practices pertain whether the tow is a four-wheel or six-wheel trailer, or a tandem tow of two six-wheel trailers. As the towed load increases, both as to length and weight, so must the degree of driver care and vigilance increase. This is especially true, where stops are concerned. The driver must be extremely conscious, at all times, of the maneuverability and performance statistics of the vehicles when the march includes difficult terrain.

(3) **BACKING SIX-WHEELED TRAILER.** Wherever possible, avoid backing. Never attempt this maneuver unless at least two men are available to guide and warn the driver. In the case of a tandem tow, disconnect the limber and second trailer from the first trailer and back the first trailer into position.

**d. Stopping the Vehicle.** To avoid undue and unnecessary strain on the truck, limber, and trailer connectors, the driver must plan his stops. The ideal stop is one where the vehicles lose momentum without the application of brakes and then halt on level ground. Use the



## TROLLEY HOIST

brakes wisely and, where possible, stop so that the load can be started with the minimum of effort. Always apply the parking brakes on the prime mover and trailer, or trailers, before leaving the vehicles.

### e. Disconnect Trailer From Limber.

(1) Set parking brakes on trailer and prime mover. Remove safety pin securing yoke block pin nut, and remove nut. Lower trailer landing gear until it is supporting the front of the trailer or until the yoke block pin is free and can be turned. **CAUTION:** *Do not remove yoke block pin yet.* Disconnect electric jumper cable from trailer and prime mover sockets, and stow in trailer. Disconnect air hoses, and connect dummy couplings. Loosen and remove upper winged nut from eye bolt. Remove lower winged nut and alining plate. Unlock and remove eye bolt lock pin, and remove eye bolt. Install eye bolt in boss at front of limber bracket, and install and lock the eye bolt lock pin (fig. 39). Screw first winged nut, all the way onto eye bolt, with wings toward rear of vehicle. Install alining block over eye bolt in limber A-frame bracket, and install second winged nut with wings toward the front, and screw up to the bracket (fig. 36).

(2) Remove yoke block pin. Raise front of trailer sufficiently to allow upper rear surface of towing bracket to clear lower front surface of trailer. Move limber forward and install yoke block pin in limber bracket yoke block. Install nut and safety pin.

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## Section VI

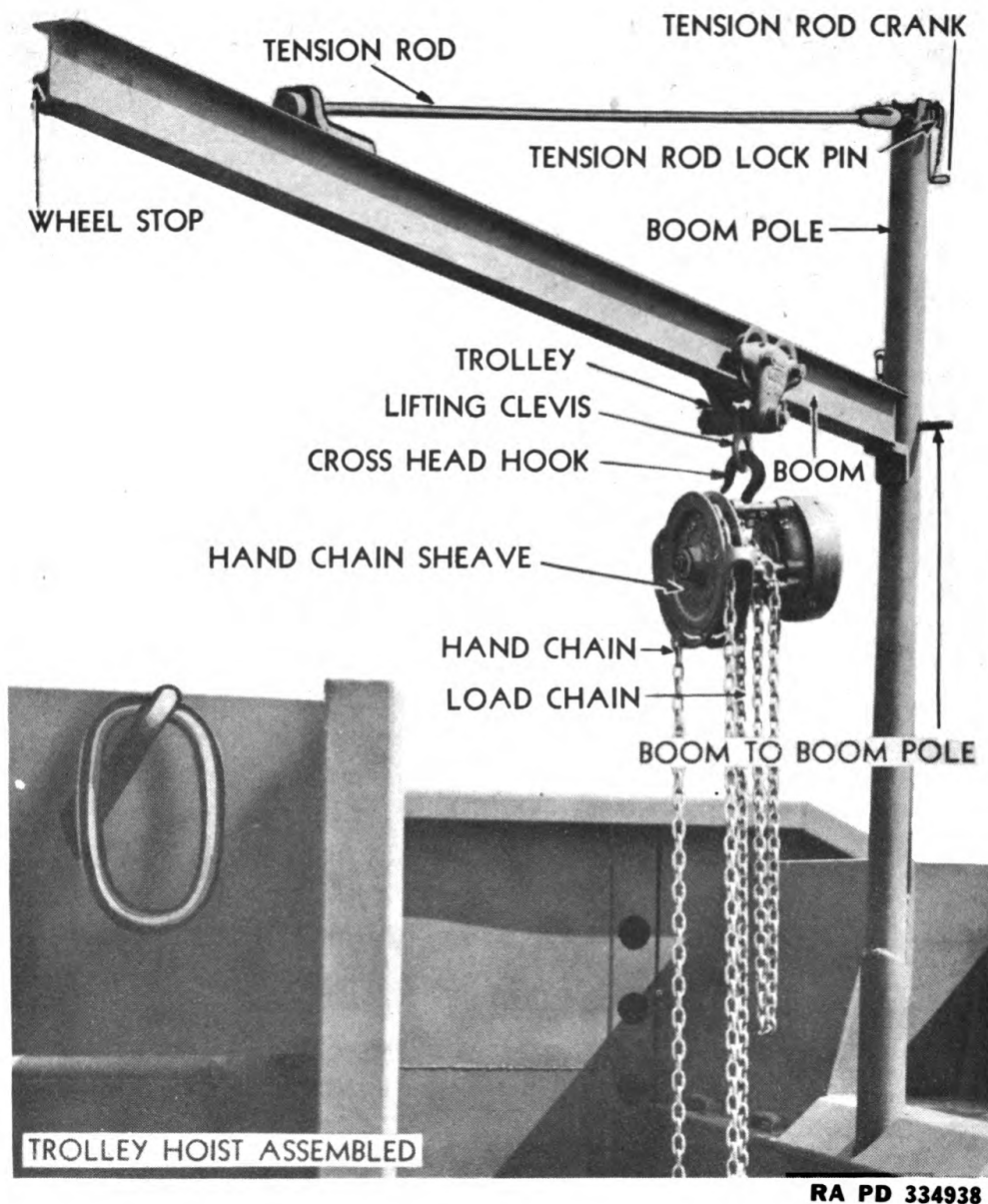
## TROLLEY HOIST

### 14. DESCRIPTION (figs. 13, 24 and 40).

a. **General.** The ammunition trailer is equipped with a boom supported trolley hoist (fig. 40). Its purpose is to facilitate the loading of ammunition rounds from the ground, loading platform or another vehicle to their respective cups in the floor of the trailer body. It is similarly employed for unloading operations.

b. **Hoist Components.** The hoist is composed of a boom pole, an I-beam boom with an adjustable tension rod, a four-wheeled ball bearing trolley, and a ball bearing spur-gearred chain hoist (fig. 13). The boom pole is set vertically in one of the two sockets provided, one on either side of the center of the ammunition well (fig. 24). The boom I-beam section, with the trolley in place, is attached to the boom pole by means of a locking pin. Boom-to-boom alinement is maintained by an adjustable tension rod. The trolley travel is limited by the boom pole on the inner end of the boom, and by a wheel stop at the outer end of the boom.

**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)**



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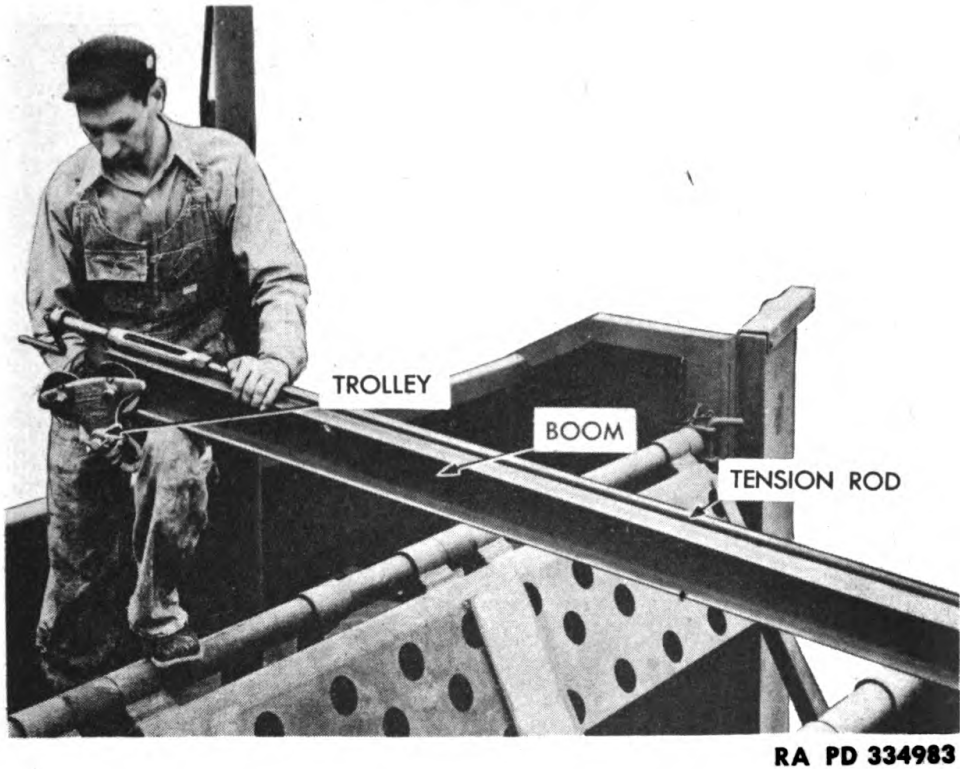
**Figure 40 – Trolley Hoist Assembled**

**15. ASSEMBLY AND DISASSEMBLY.**

**a. Assembly.**

(1) **INSPECT COMPONENTS.** Remove the boom pole, boom, and tension rod assembly from the compartment at the rear of the body (fig. 15). Remove the trolley and the chain hoist from the compartment in the right side of the body (fig. 12). See that the boom pole is straight and that the two locking pins are present and serviceable. Clean dirt or other foreign matter from boom trolley track. See that the threads in the tension rod loop and on the adjusting crank are

## TROLLEY HOIST



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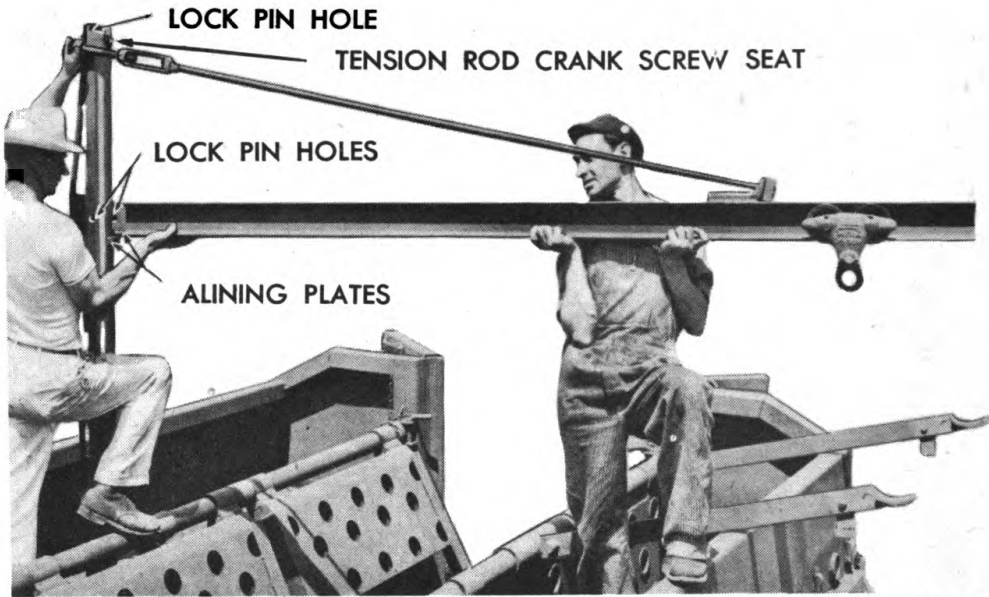
**Figure 41 — Installing Trolley on Boom**

clean and in good condition. Inspect eye in lifting clevis and supporting pin for excessive wear or fracture. Inspect trolley wheels for looseness, and be sure they rotate freely. Try hand sheave on hoist for ease of turning and inspect hooks at cross head and on load chain for serviceability.

(2) **INSTALL BOOM POLE.** Disconnect and remove ridge pole, if it is in place, to prevent damage to rope. Unlock and open rear doors and hook in open position (fig. 23). *NOTE: If vehicle is loaded, propelling charges are probably obstructing hole at top of boom pole socket. Place these charges elsewhere on the load, preferably on the opposite side of the vehicle. See that inside of socket is cleared of any foreign material.* Two men lift boom pole into trailer and lower the end having larger diameter into the desired socket (fig. 24).

(3) **INSTALL BOOM AND TROLLEY.** Lift boom assembly into trailer. Turn boom pole so that boom end slot is toward crew. Install trolley on boom as in figure 41. With trolley held at outer end of boom by one man, and a second man to lift and guide inner end, lift boom and guide inner end into slot in boom pole (fig. 42). Raise crank end of tension rod over top of boom pole, and rest threaded portion of crank in slot formed at pole top and secure with locking pin (fig. 43). Ascertain that the locking feature of the locking pin is

**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)**



RA PD 334984

**Figure 42 — Installing Boom and Tension Rod Assembly**

square with pin end. Have man at outer end of boom move the boom, as necessary, so that a second man can install the boom locking pin. Adjust the tension rod so that boom is square with boom pole (fig. 44). Turn tension rod crank clockwise one additional full turn. **NOTE:** *This done to elevate the outer end of the boom pole sufficiently to compensate for the load which is to be lifted.*

(4) **INSTALL CHAIN HOIST.** Lift chain hoist into trailer. Lift hoist, and engage hoist cross head hook into eye of trolley lifting clevis (fig. 40).

**b. Disassembly.**

(1) Remove chain hoist, and stow in hoist compartment.

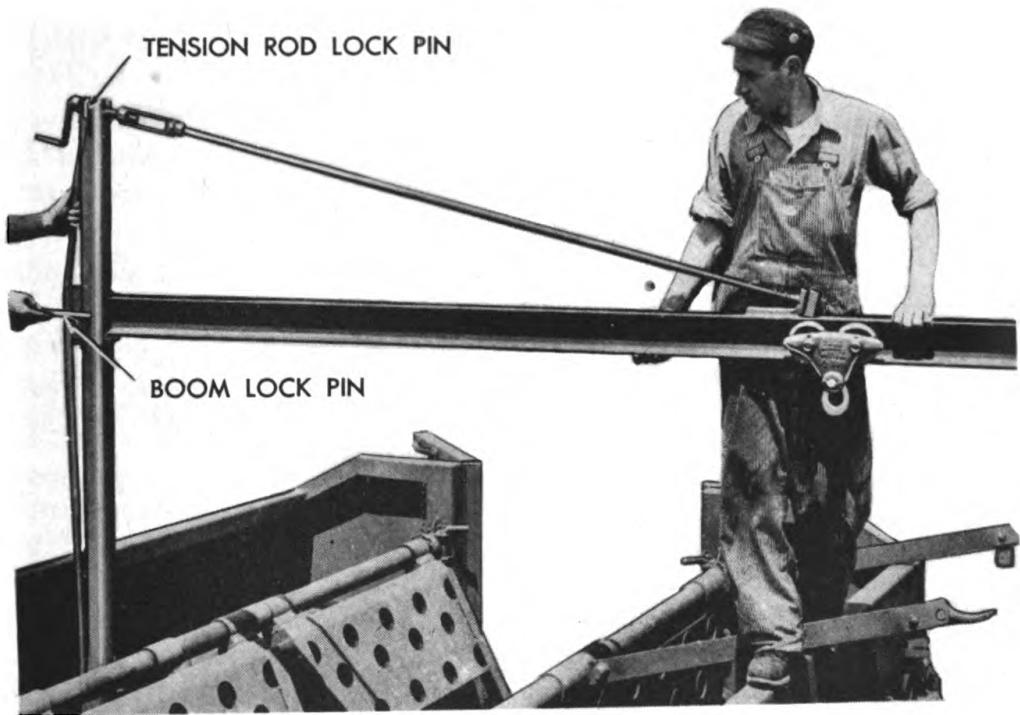
(2) With one man supporting outer end of boom, turn counter-clockwise on tension rod crank, and loosen tension rod, until it can be lifted out of its slot. Remove tension rod locking pin and lift tension rod out of boom pole slot, and down onto top of boom. Remove boom-to-boom pole locking pin.

(3) While man at outer end of boom retains trolley, pull boom out of slot in boom pole. Remove trolley, and lower the boom pole over the side of the vehicle to the ground. Use two men to lift boom pole out of the socket and out of the vehicle.

(4) Stow boom and boom pole in compartment at rear of vehicle. Stow trolley in hoist compartment. Close, and secure, both compartment doors.



## TROLLEY HOIST



RA PD 334985

**Figure 43 — Installing Boom-to-boom Pole Locking Pin**



RA PD 334986

**Figure 44 — Adjusting Boom To Proper Level**

**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)****16. OPERATION.****a. Operating Hoist.**

(1) **LOAD CHAIN.** The load chain rides in the load chain sheave at the center of the hoist, and is attached to its load by means of a load hook shackled at the chain end. The load chain is raised or lowered by operating the hand chain.

(2) **HAND CHAIN.** The endless hand chain rides in the large hand chain sheave at the end of the hoist. As the operator faces the sheave, pulling the chain out of the right side of the sheave raises the load chain hook; pulling chain out of left side of sheave releases brake and lowers the load hook. The load is automatically held at the point where manipulation of the hand chain ceases.

**b. Loading.** If trailer doors are closed, open, and secure them. Swing the boom to a point where the hoist is directly above the lifting eye in the shell. Raise or lower loading chain as needed and engage load hook in the lifting eye of the shell. Elevate hoist sufficiently for load to clear any obstructions and swing boom rearward until shell is suspended centrally between the open doors. Raise hoist until bottom of round is about 3 inches above the level of the trailer floor. One man, in vehicle, swings boom and guides trolley, until shell is directly over the desired floor plate cup. *NOTE: In order to prevent damage to ammunition, and to be assured that each shell will set squarely in its cup, examine each cup before lowering shell, and remove any sand, gravel, or other foreign material.* Lower slowly and guide shell all the way, until it is seated in floor plate cup. Disconnect load chain hook.

**c. Unloading.**

(1) **Remove tarpaulin.** Loosen ridge pole and place rope in front of vehicle on fuse box. Open rear doors and latch in open position. Unload propelling charges.

(2) **Assemble trolley hoist (par. 15).** Open ammunition racks and secure center section, on boom pole side, with chain around boom pole as in figure 25.

(3) **NOTE:** *The actual operation of unloading is in the use of the hoist which is described in subparagraph a and b above.*

## PART THREE — ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

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### Section VII LUBRICATION

#### 17. GENERAL INSTRUCTIONS.

a. War Department Lubrication Order No. 799 prescribes lubrication maintenance for the 8-ton, 4-wheel Ammunition Trailer M23. Figures 45 and 46, though not exact facsimiles of WDLO No. 799, contain the same information as does the WDLO.

b. A Lubrication Order is placed on or is issued with each item of materiel and is to be carried with it at all times. In the event the materiel is received without such a copy, the using arm shall immediately requisition a replacement from the Commanding Officer, Fort Wayne Ordnance Depot, Detroit 32, Michigan.

c. Service intervals specified on the Order are for normal operating conditions. Reduce these intervals under extreme conditions such as excessively high or low temperatures, prolonged periods of high speed, continued operation in sand or dust, immersion in water, or exposure to moisture; any one of which may quickly destroy the protective qualities of the lubricant, and require servicing in order to prevent malfunctioning or damage to the materiel.

d. Lubricants are prescribed in the "Key" in accordance with three temperature ranges; above  $+32^{\circ}\text{F}$ ,  $+32^{\circ}\text{F}$  to  $0^{\circ}\text{F}$ , and below  $0^{\circ}\text{F}$ . Determine the time to change grades of lubricants by maintaining a close check on operation of the vehicle during the approach to change-over periods. Ordinarily it will be necessary to change grades of lubricants *only when air temperatures are consistently in the next higher or lower range*, unless malfunctioning occurs sooner due to lubricants being too thin or too heavy.

#### 18. DETAILED LUBRICATION INSTRUCTIONS.

a. **Lubrication Equipment.** Operate lubricating guns carefully and in such manner as to insure a proper distribution of the lubricant. If lubrication fitting valves stick, and prevent the entrance of lubricant, remove the fitting and determine cause. Replace broken or damaged lubricators. If lubricator cannot be replaced immediately, cover hole as a temporary expedient with tape, to prevent the entrance of dirt.

# TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

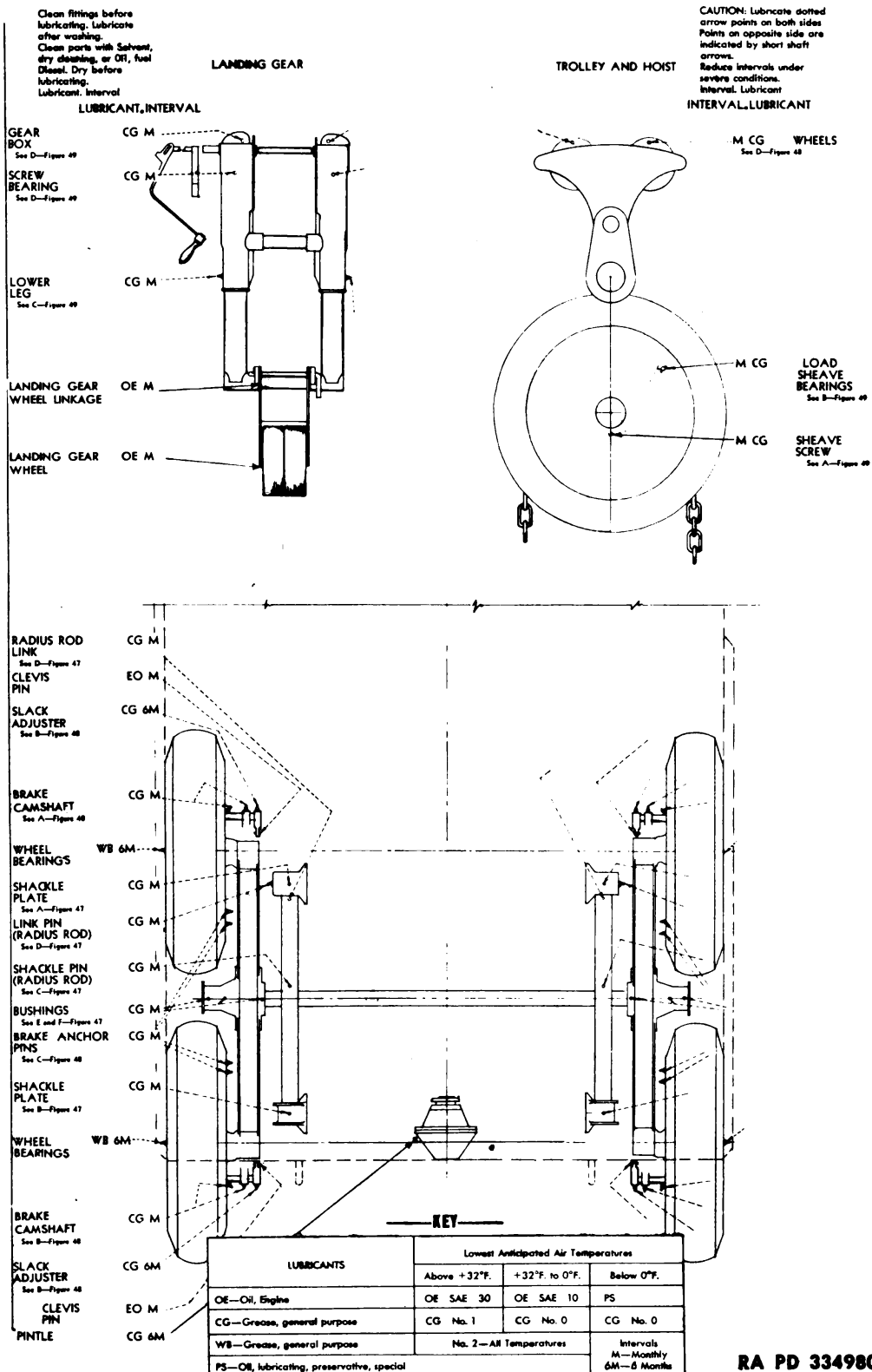
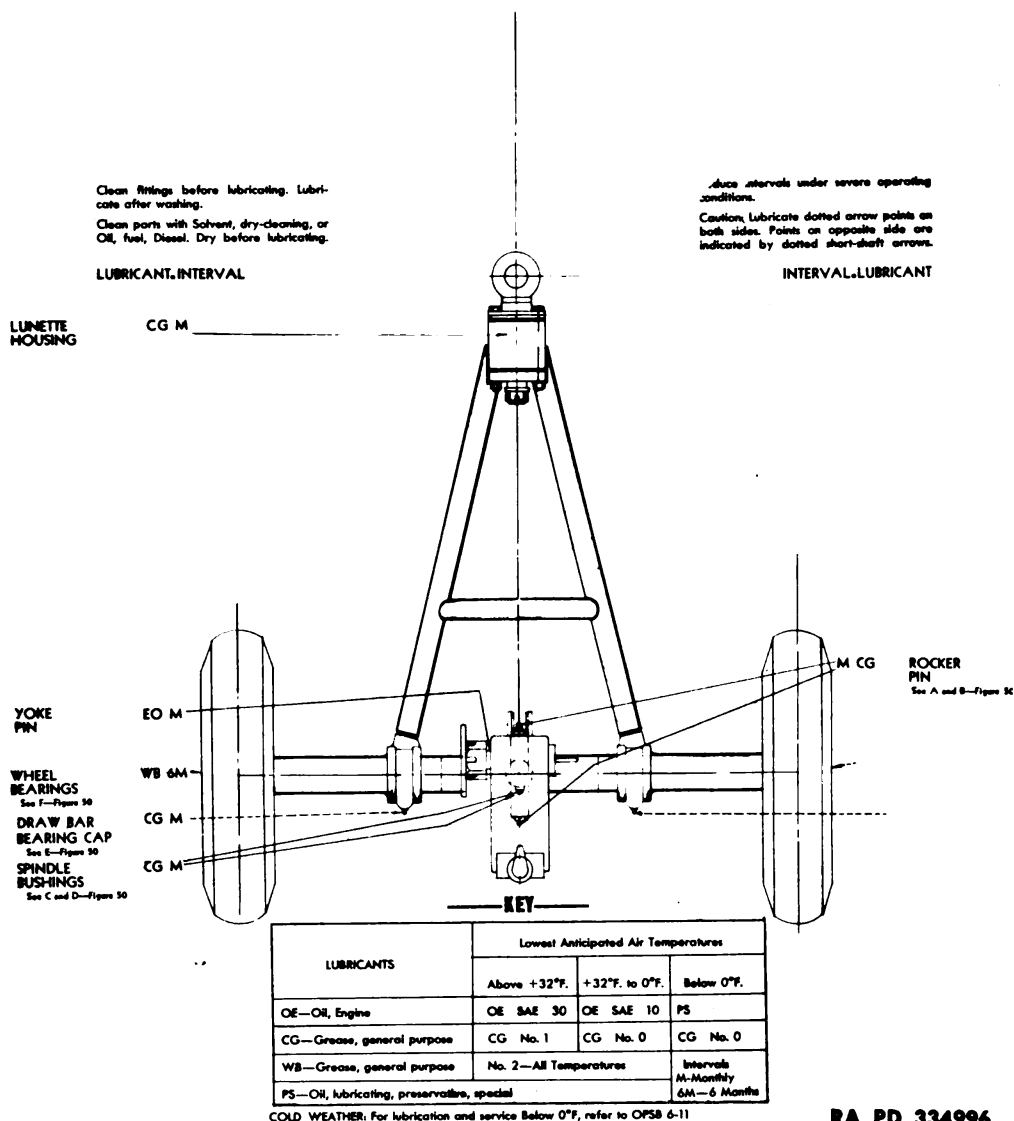


Figure 45 — Lubrication Order — Ammunition Trailer M23



# LUBRICATION



**Figure 46 — Lubrication Order — Heavy Carriage Limber M5**

## b. Points of Application.

(1) Lubrication fittings, grease cups, oilers, and oilholes are readily identifiable on the vehicle. Wipe clean such lubricators and the surrounding surface before lubricant is applied.

(2) Where relief valves are provided, apply new lubricant until the old lubricant is forced from the vent. Exceptions are specified in notes or on the Lubrication Order.

(3) Always wipe clean metal surfaces on which a film of lubricant must be maintained by manual application, before the film is renewed.

c. **Cleaning.** Use SOLVENT, dry-cleaning, or OIL, fuel, Diesel, to clean or wash all parts. Use of gasoline for this purpose is pro-

**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)**

hibited. After washing, dry all parts thoroughly before applying lubricant.

**d. Lubrication Notes on Individual Units and Parts.** The following instructions supplement, and repeat for clarity, those notes on the Lubrication Order which pertain to lubrication and service of individual units and parts.

(1) **WHEEL BEARINGS.** Remove bearings from hub and wash in SOLVENT, dry-cleaning, until all the old lubricant is removed from both inside and outside of bearing cone. Dry bearings. Wheel bearings shall be packed with a wheel bearing packer with GREASE, general purpose, No. 2, or hand packed by kneading the lubricant into all spaces in the bearing. The outer surfaces of the bearing cone assembly shall be coated with grease before assembly. The inside surfaces of the wheel hub and the outside of the spindle shall be wetted only with GREASE, general purpose, No. 2. The maximum thickness of this film of lubricant shall be  $\frac{1}{16}$  inch. No lubricant shall be packed in the hub or cap.

(2) **LIMBER LUNETTE.** When the limber is being used over dusty or sandy terrain, the lunette housing requires more frequent service. Once a week, under dusty conditions, perform the following operations, as shown below:

(a) Completely disassemble the lunette as described in paragraph 98.

(b) Clean out the lunette housing and clean all moving parts with dry-cleaning solvent. Make certain that none of the old grease remains in the housing.

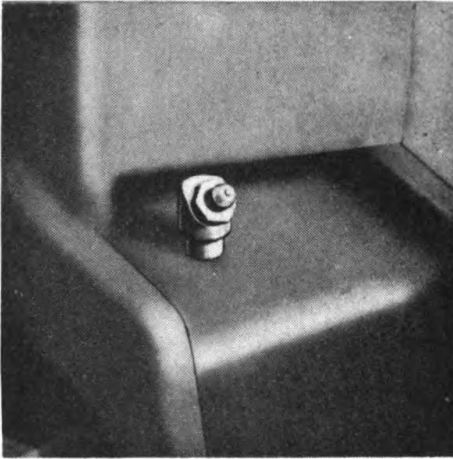
(c) Install the lunette spring, front and rear bushings and housing front cover (par. 98). Fill housing  $\frac{1}{3}$  full with lubricant recommended in Lubrication Order.

(d) Install lunette shaft and secure.

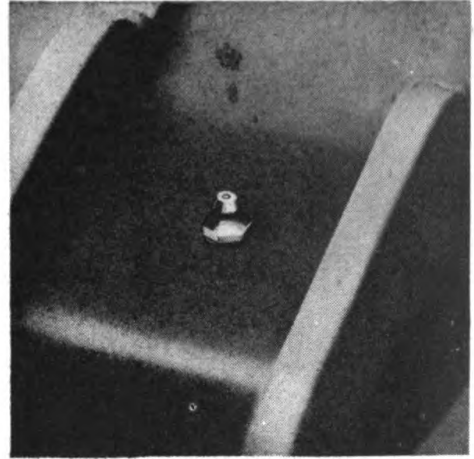
(3) **LIMBER YOKE PIN AND TOWING BRACKET BEARING SURFACES.** When the limber is used over dusty or sandy terrain, the yoke pin and bracket bearing surfaces must be serviced daily. Remove the yoke pin. Clean the bearing surfaces and lubrication grooves thoroughly with dry-cleaning solvent. Carefully clean the yoke pin bore and the towing bracket in the same manner. When the cleaned surfaces are dry, swab bearing surfaces with the recommended lubricant, and install.

(4) **LIMBER DRAW BAR BEARINGS AND TOWING BRACKET SPINDLE.** The recommendations of the Lubrication Order cover servicing of these units over hard surfaced roads. When the use is in dust or sand, the towing bracket spindle and rocker pin must be lubricated once

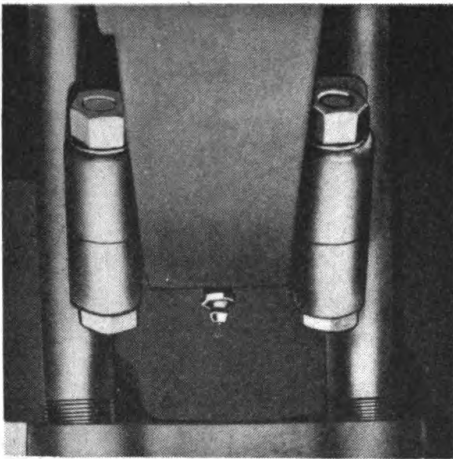
# LUBRICATION



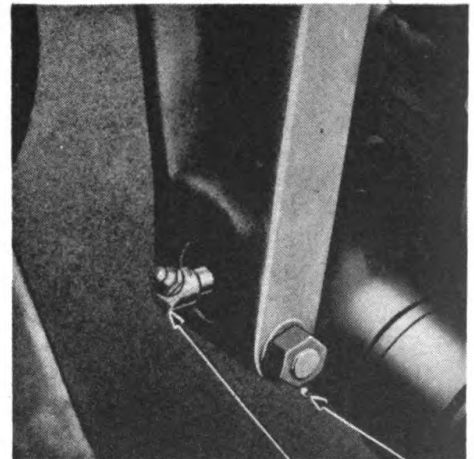
A SPRING HANGER  
WEAR PLATE (FRONT)



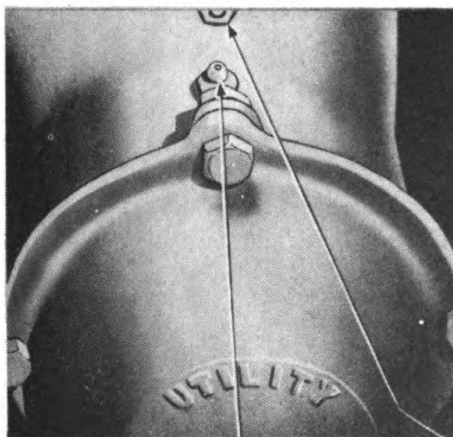
B SPRING HANGER  
WEAR PLATE (REAR)



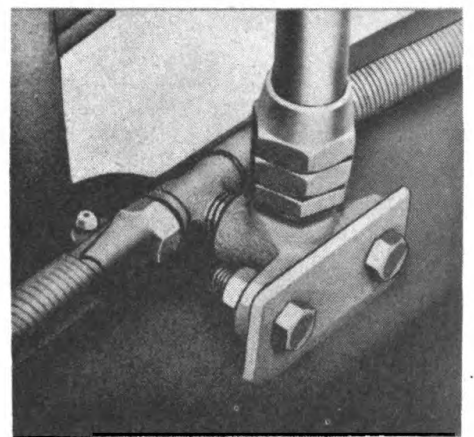
C RADIUS ROD SHACKLE PIN



D RADIUS ROD LINK PIN AND LINK



E WALKING BEAM  
OUTER BUSHING WALKING BEAM  
HUB CENTER

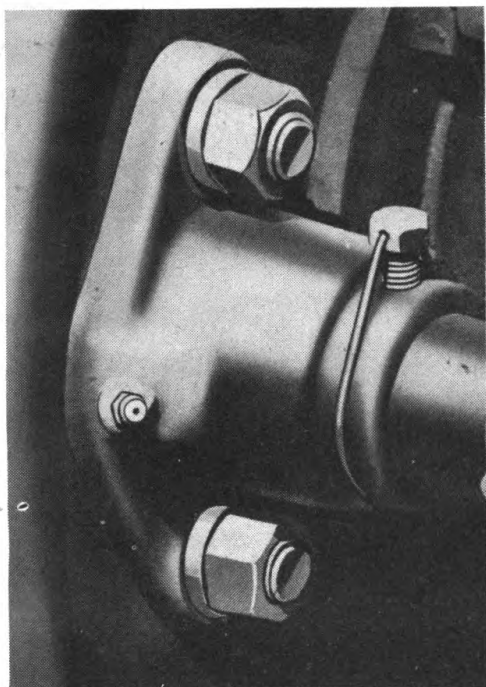


F WALKING BEAM INNER BUSHING

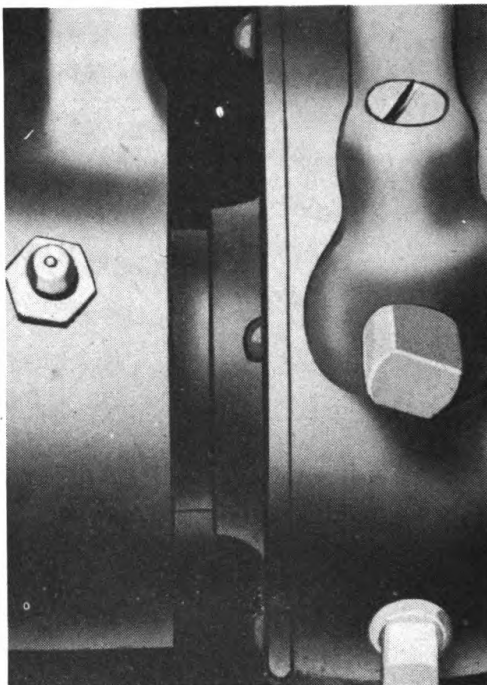
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**Figure 47 — Localized Lubrication Views (Trailer)**

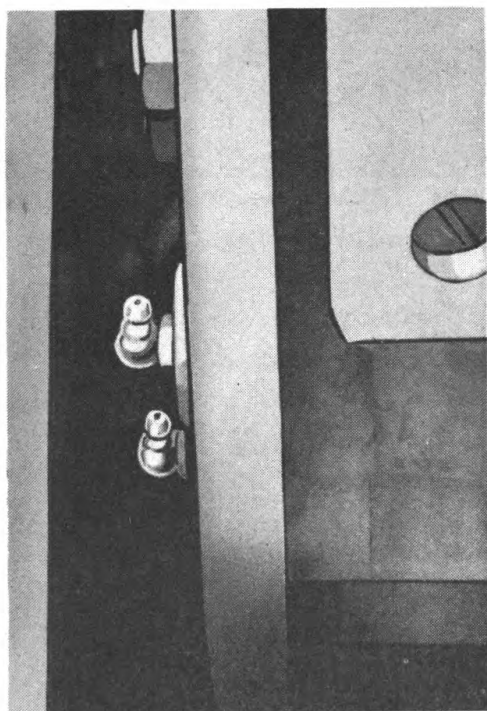
TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



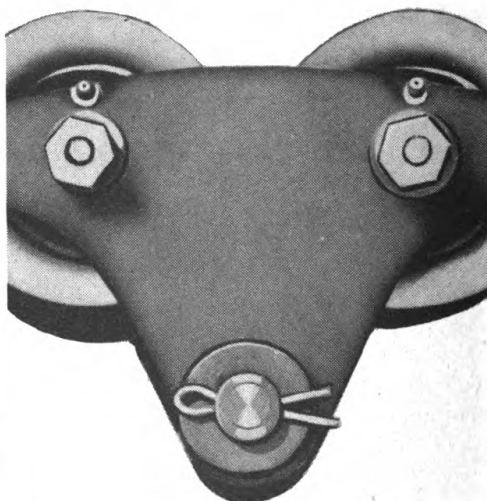
A — BRAKE CAMSHAFT BUSHING  
(4 FITTINGS) LUBRICATE SPARINGLY



B — OUTER CAMSHAFT SUPPORT  
(4 FITTINGS)  
AND SLACK ADJUSTER (4 FITTINGS)



C — BRAKE SHOE ANCHOR PINS  
(8 FITTINGS) LUBRICATE SPARINGLY

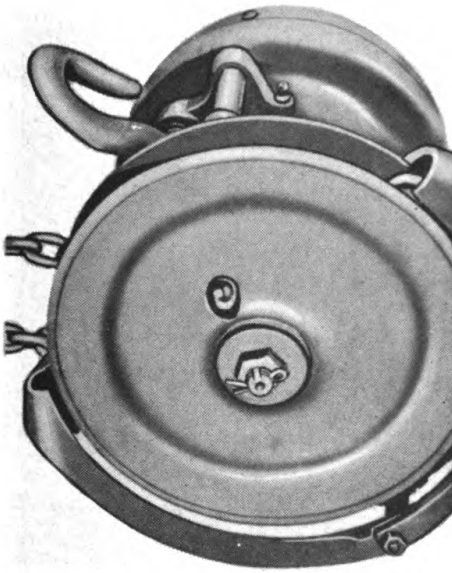


D — TROLLEY AXLES (4 FITTINGS)

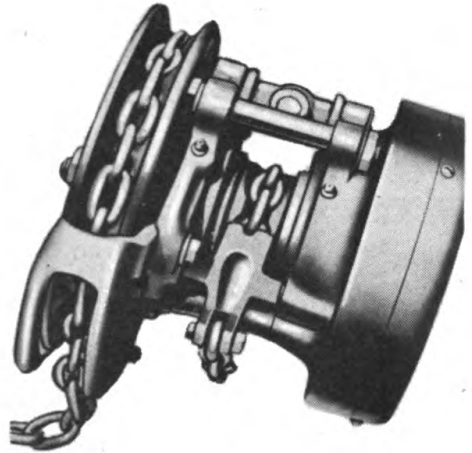
RA PD 334913

**Figure 48 — Localized Lubrication Views (Trailer)**

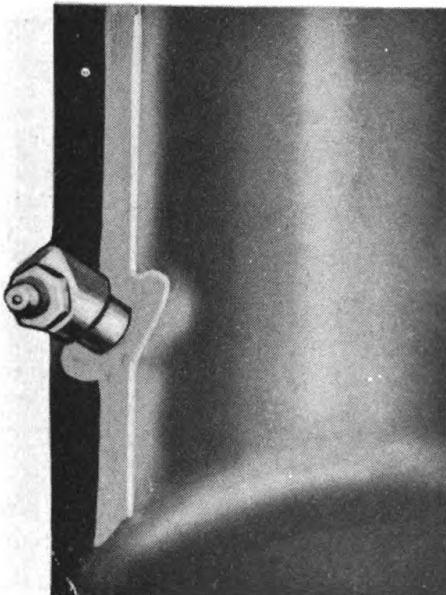
LUBRICATION



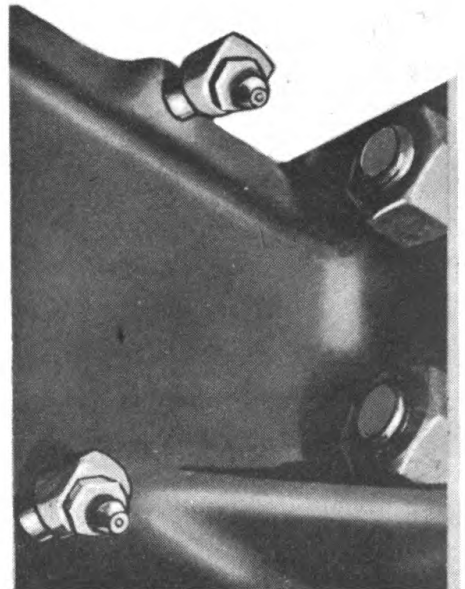
A—HAND SHEAVE SCREW



B—LOAD SHEAVE BEARINGS



C—LANDING GEAR LOWER LEG  
(2 FITTINGS)



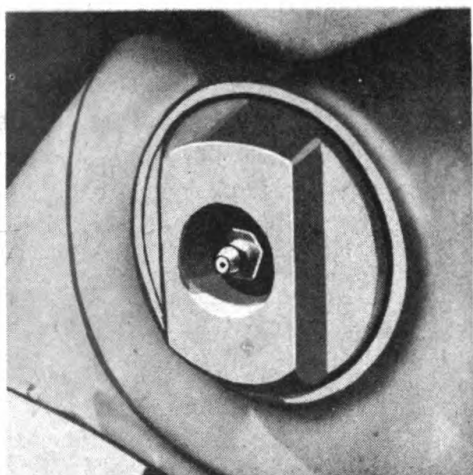
D—LANDING GEAR BEVEL GEARS  
(2 FITTINGS)

RA PD 334978

*Figure 49 — Localized Lubrication Views (Trailer)*



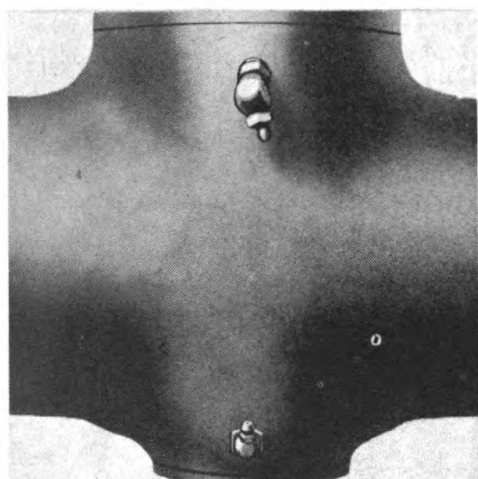
**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)**



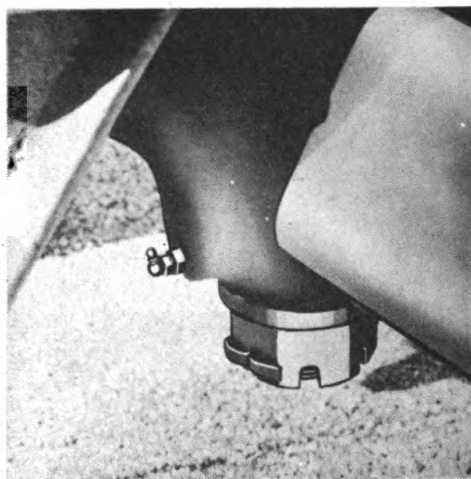
A — BRACKET ROCKER  
PIN BUSHING — REAR



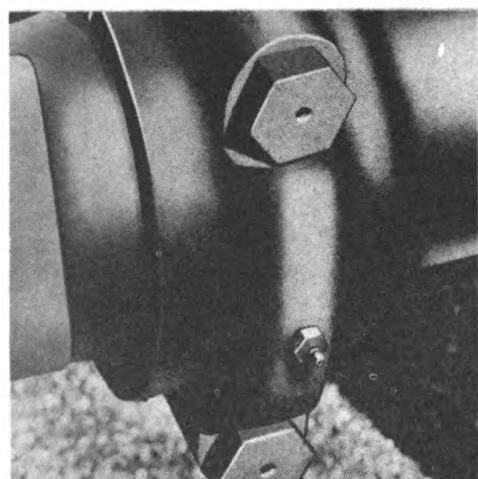
B — BRACKET ROCKER PIN  
BUSHING — FRONT



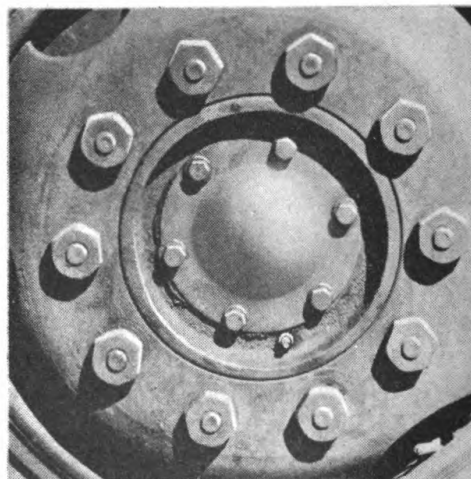
C — SPINDLE BUSHING — UPPER



D — SPINDLE BUSHING — LOWER



E — DRAWBAR BEARING (2 FITTINGS)



F — WHEEL BEARING (2 FITTINGS)

RA PD 334979

**Figure 50 — Localized Lubrication Views, Heavy Carriage Limber M5**

## FIRST ECHELON PREVENTIVE MAINTENANCE SERVICES

daily. The draw bar bearings must be lubricated every 4 hours. Lubricate these points, with a pressure gun, until clean grease is forced out.

(5) **LIMBER EYE BOLT.** Clean the eye bolt threads and the threads inside the winged nuts. Lubricate lightly after cleaning, and remove all excess lubricant. When the vehicle is used through sand or dust, brush threads clean but do not lubricate.

(6) **OILCAN POINTS.** Lubricate brake lever, links, clevis and pins, landing wheel and linkage.

(7) **POINTS REQUIRING NO LUBRICATION.** Spring leaves do not require lubrication. Do not lubricate door or fuse box hinges.

### e. Reports and Records.

(1) If lubrication instructions are closely followed, proper lubricants used, and satisfactory results are not obtained, report the trouble to the ordnance officer responsible for the maintenance of the materiel.

(2) A record of lubrication may be kept in the Duty Roster (W.D., A.G.O. Form No. 6).

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## Section VIII

## FIRST ECHELON PREVENTIVE MAINTENANCE SERVICES

### 19. PURPOSE.

a. To insure mechanical efficiency, it is necessary that this vehicle be systematically inspected at intervals each day it is operated and weekly, so that defects may be discovered and corrected before they result in serious damage or failure. Certain scheduled maintenance services will be performed at these designated intervals. The services set forth in this section are those performed by driver or crew before operation, during operation, at halt, and after operation and weekly.

b. Driver preventive maintenance services are listed on the back of "Drivers Trip Ticket and Preventive Maintenance Service Record" W.D. Form No. 48 to cover vehicles of all types and models. Items peculiar to specific vehicles but not listed on W.D. Form No. 48 are covered in manual procedures under the items to which they are related. Certain items listed on the form that do not pertain to the vehicles involved are eliminated from the procedures as written into the manual. Every organization must thoroughly school each driver in performing the maintenance procedures set forth in manuals, whether they are listed specifically on W.D. Form No. 48 or not.

c. The items listed on W.D. Form No. 48, that pertain to these vehicles, are expanded in this manual to provide specific procedures

## TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

for accomplishment of the inspections and services. These services are arranged to facilitate inspection and conserve the time of the driver, and are not necessarily in the same numerical order as shown on W.D. Form No. 48. The item numbers, however, are identical with those shown on that form.

d. The general inspection of each item applies also to any supporting member or connection, and generally includes a check to see whether or not the item is in good condition, correctly assembled, secure, or excessively worn.

e. The inspection for "good condition" is usually an external visual inspection to determine whether or not the unit is damaged beyond safe or serviceable limits. The term "good condition" is explained further by the following: not bent or twisted, not chafed or burned, not broken or cracked, not bare or frayed, not dented or collapsed, not torn or cut, not deteriorated.

f. The inspection of a unit to see that it is "correctly assembled" is usually an external visual inspection to see whether or not it is in its normal assembled position in the vehicle.

g. The inspection of a unit to determine if it is "secure" is usually an external visual examination, a hand-feel, or a pry-bar check for looseness. Such an inspection should include any brackets, lock washers, lock nuts, locking wires, or cotter pins used in assembly.

h. "Excessively worn" will be understood to mean worn close-to, or beyond, serviceable limits, and likely to result in a failure if not replaced before the next scheduled inspection.

i. Any defects or unsatisfactory operating characteristics beyond the scope of first echelon to correct must be reported at the earliest opportunity to the designated individual in authority.

## 20. BEFORE-OPERATION SERVICE.

a. **Purpose.** This inspection schedule is designed primarily as a check to see that the vehicle has not been tampered with, or sabotaged, since the After-operation Service was performed. Various combat conditions may have rendered the vehicle unsafe for operation, and it is the duty of the driver to determine whether or not the vehicle is in condition to carry out any mission to which it may be assigned. This operation will not be entirely omitted, even in extreme tactical situations.

b. **Procedures.** Before-operation Service consists of inspecting items listed below according to the procedure described, and correcting or reporting any deficiencies. Upon completion of the service, results should be reported promptly to the designated individual in authority.

## FIRST ECHELON PREVENTIVE MAINTENANCE SERVICES

(1) **ITEM 1, TAMPERING AND DAMAGE.** Look for any injury to trailer and limber and their accessories and special equipment, caused by tampering or sabotage, collision, falling debris, or shell fire since parking.

(2) **ITEM 5, AIR BRAKE TANKS.** Examine trailer air brake reservoir tanks, air lines, fittings, and connections for looseness or damage. Drain water from tanks, and close drain cocks. Be sure truck to trailer air couplings are securely connected, and lines properly supported.

(3) **ITEM 12, LAMPS (LIGHTS) AND REFLECTORS.** Clean all trailer lights and warning reflectors, and examine them for looseness or damage. If tactical situation permits, open and close all switches, and observe if lights respond properly, include stop and black-out lights.

(4) **ITEM 13, WHEEL AND FLANGE NUTS.** Inspect all trailer and limber wheel mounting and axle flange nuts to see that they are present and secure.

(5) **ITEM 14, TIRES.** Be sure all trailer and limber tires are properly inflated, to 70 pounds (maximum) cool, and that valve caps are present and finger tight. Remove objects lodged in treads, and carcasses, and inspect for damage.

(6) **ITEM 15, SPRINGS OR WALKING BEAM, AND SUSPENSIONS.** Inspect trailer walking beam and springs for looseness or damage. Include trailer air brake cylinder carriers and stub axle assemblies. Look for excessive spring sag, and broken or shifted leaves. See that spring rebound clips are present and secure. If limber is connected, support trailer on landing gear, and examine towing bracket spindle for excessive looseness.

(7) **ITEM 18, TOWING CONNECTIONS.** Inspect all towing devices to see that they are in good condition, securely connected or mounted, and locked. See that limber towing bracket spindle operates properly, and, if connected to trailer, see that yoke block pin is secured, and that all safety pins are in, and fastened.

(8) **ITEM 19, BODY, LOAD, AMMUNITION RACKS, RIDGE POLE AND TARPAULINS.** See that doors operate properly, and latch securely in open or closed position. See that any load carried is secure and properly distributed, and that tarpaulin is in good condition and properly installed. Inspect trailer for damage or loose attachments and, if loaded, be sure ammunition rounds are in correct position and properly secured. Inspect hinged box sections of ammunition racks for damage. If loaded, see that rack locking levers are in good condition and that chain locks are tight, and properly latched. See that hinge tubes are straight and not damaged, and that retaining pins are in place. When load permits, check, and at each loading, note operation

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of all box sections, rack locking levers, chains and latches. Carefully inspect ridge pole rope for fraying and wear, particularly at spring loop and at point where rope contacts top of rear door and locking device. Inspect spring for tension and security.

(9) **ITEM 21, TOOLS AND EQUIPMENT.** Be sure all items of trailer on-vehicle tools, and standard and special equipment are present, serviceable and properly stowed or mounted. Inspect chain hoist to be sure it is in good condition. Examine hook at cross head to see if it is serviceable and turns on swivel freely. Examine load and hand chains carefully to assure that all links are serviceable and not damaged. Inspect lift hook for excessive bearing wear or looseness and proper swiveling. Check hand chain sheave for excessive wear. At each loading or unloading, check operation of hoist before use and note particularly the locking action of ratchet. See that trolley wheels turn freely and are not excessively worn or fractured. Inspect trolley wheel axles for wear and be sure they are secure in frame. Inspect lifting clevis eye and supporting cross pin for serviceability and security.

(10) **ITEM 23, VEHICLE PUBLICATIONS.** Check to see that Operator's Manual, Lubrication Order, and Form No. 478 are present in vehicle, legible, and properly stowed.

## 21. DURING-OPERATION SERVICE.

a. **Noises.** While trailer is in motion, listen for any unusual noise such as rattles, knocks, squeals, or hums that may indicate trouble. Be on the alert for indications of trouble from any part of vehicle. Watch for over-heated components, such as brakes or bearings, or other signs of trouble. Each time brakes are applied, or vehicles turned, consider this a test and note any unusual or unsatisfactory performance. Watch truck brake instruments constantly. Notice promptly any unusual instrument indications that may signify trouble in the braking system.

b. **Procedures.** During-operation Service consists of observing items listed below according to the procedures following each item, and investigating any indications of serious trouble. Notice minor deficiencies to be corrected or reported at earliest opportunity, usually next scheduled halt.

(1) **ITEM 27, FOOT AND HAND BRAKES.** Test trailer brake application valves for proper operation. Foot-and-hand applied air brakes should stop vehicle effectively with normal pressure or leverage, and without pull to one side. Test trailer brake separately for effective operation.

(2) **ITEM 34, RUNNING GEAR.** Be on alert for any unusual operating characteristics or noise from wheels, axles, or suspension units on



## FIRST ECHELON PREVENTIVE MAINTENANCE SERVICES

limber or trailer, that might indicate looseness, or damaged or under-inflated tires.

(3) **ITEM 35, TRAILER BODY.** Note any noise or abnormal condition, on the trailer, that might indicate shifting of load, loose tarpaulin, loose or damaged doors, hardware, special trailer equipment, or mounted body attachments. Observe any unusual sway that might indicate broken or improperly connected towing devices.

## 22. AT-HALT SERVICE.

**a. Importance.** At-halt Service may be regarded as minimum maintenance procedures and should be performed under all tactical conditions even though more extensive maintenance services must be slighted or omitted altogether.

**b. Procedures.** At-halt Service consists of investigating any deficiencies noted during operation, inspecting items listed below according to the procedures following the items, and correcting any deficiencies found. Deficiencies not corrected should be reported promptly to the designated individual in authority.

(1) **ITEM 39, TEMPERATURES: HUBS, BRAKE DRUMS AND AXLES.** Place hand cautiously on each limber and trailer wheel hub, trailer brake drum, and walking beam bearing housing to see if they are abnormally hot.

(2) **ITEM 42, SPRINGS AND SUSPENSIONS.** Examine trailer springs, walking beams, and axle suspensions for looseness or damage.

(3) **ITEM 44, WHEEL AND FLANGE NUT.** See that trailer and limber wheel mounting and flange nuts are present and secure.

(4) **ITEM 45, TIRES.** Inspect all trailer and limber tires for under-inflation and damage. Correct pressure is 70 pounds (maximum) cool. Remove objects lodged in treads, carcasses, and from between duals.

(5) **ITEM 48, AIR CLEANERS.** Be sure brake system air line filters are in good condition and all connections secure.

(6) **ITEM 50, TOWING CONNECTIONS.** Inspect all towing connections for looseness or damage. Be sure locking and safety devices are secure. If limber is used, check condition of towing bracket spindle, and be sure it is properly secured by nut and cotter pin. See that both eye bolt nuts are present and locked.

(7) **ITEM 51, BODY, LOAD, RIDGE POLE AND TARPAULIN.** Examine all applicable items on trailer for looseness or damage. See that hoist compartment and boom and boom pole compartment doors are securely latched. Load must be properly distributed and secure. See that ridge pole is secure. Tarpaulin must be properly lashed when in use.

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(8) **ITEM 52, GLASS.** Clean trailer lights, and warning reflector glass, and inspect for looseness and damage.

**23. AFTER-OPERATION AND WEEKLY SERVICE.**

a. **Purpose.** After-operation Service is particularly important because at this time the driver inspects his vehicle to detect any deficiencies that may have developed, and corrects those he is permitted to handle. He must report promptly to the designated individual in authority the results of his inspection. If this schedule is performed thoroughly, the vehicle will be ready for use on a moment's notice. The Before-operation Service, with a few exceptions, is then necessary only to ascertain whether or not the vehicle is in the same condition in which it was left upon completion of the After-operation Service. The After-operation Service should never be entirely omitted even in extreme tactical situations, but may be reduced to the bare fundamental services outlined for the At-halt Service, if necessary.

b. **Procedures.** When performing the After-operation Service, the driver must remember, and consider, any irregularities noticed during the day in the Before-operation, During-operation, and At-halt Services. The After-operation Service consists of inspecting and servicing the following items: (Those items of the After-operation that are marked by an asterisk (\*) require additional weekly services, the procedures for which are indicated in step (b) of each applicable item.)

(1) **ITEM 59, LAMPS (LIGHTS) AND REFLECTORS.** Clean glass lenses and inspect all units on trailer for looseness or damage. If tactical situation permits, test all light switches for correct operation, and see that all lamps respond properly.

(2) **ITEM 64, ELECTRICAL WIRING.** Examine all accessible wiring and connections, on trailer for looseness or damage, wipe off grease or moisture, and be sure wiring is supported so as not to chafe against other vehicle parts. Examine jumper cable for chafing or broken insulation and see that terminals are in good condition. Examine cable sockets on trailer to be certain they are clean; that seals are serviceable, and that blade-type contacts are in good condition.

(3) **ITEM 65, \*AIR CLEANERS.**

(a) Examine air line filters for damage and loose mountings or connections. Drain off accumulated sediment and water.

(b) *Weekly.* Remove filter bowls and elements, wash in dry-cleaning solvent, and reinstall securely using new gaskets as necessary.

(4) **ITEM 68, \*TIRES.**

(a) Examine trailer and limber tires, including spares, for damage and excessive wear. Remove objects lodged in treads and carcasses,

## FIRST ECHELON PREVENTIVE MAINTENANCE SERVICES

and from between duals. Inspect for proper position of valve stems and presence of valve caps. Inflate to correct pressure, 70 pounds (maximum) cold.

(b) *Weekly.* Replace badly worn or otherwise unserviceable trailer and limber tires. Serviceable tires which show abnormal wear should be rotated to other wheel positions. Apparent mechanical defects causing such wear should be reported for attention by higher echelon.

(5) **ITEM 69, SPRING AND SUSPENSIONS.** Examine trailer springs, and walking beams and axle assemblies, including brake chamber carrier, and beam axle mountings for looseness and damage. Check operation of landing gear legs and limber, and check condition of limber locking pin and bosses.

(6) **ITEM 75, \*AIR BRAKE TANKS.**

(a) Inspect all air tanks on trailer for looseness and damage. See that all connections are tight, and that air lines are properly supported so as not to chafe on other vehicle parts. Drain water from air tanks and close drain cocks.

(b) *Weekly.* Have assistant operate all brake control valves and listen for air leaks. Tighten tank mountings and all connections where leaks are heard. Clean oil from all trailer air line rubber hose.

(7) **ITEM 77, \*TOWING CONNECTIONS.**

(a) Inspect trailer rear pintle and towing shackles for looseness, damage, and excessive wear. Examine limber towing yoke, yoke pin block and eye bolt for wear or damage. See that locking or safety pins operate properly, and lock securely.

(b) *Weekly.* Tighten all towing device mounting and assembly nuts securely. Test limber connecting and locking mechanism for proper operation.

(8) **ITEM 78, BODY, LOAD, AMMUNITION RACKS, RIDGE POLE AND TARPAULIN.** Examine body carefully for damage or loose parts. See that doors fit and operate properly, and latch securely. Any load carried must be properly distributed and securely stowed. Inspect trailer frame and hose section supports for damage or looseness. Inspect entire unit for broken assembly welds. Inspect hinged box sections of ammunition racks for damage. If loaded, see that rack locking levers are in good condition, and that chain locks are tight and properly latched. See that hinge tubes are straight and not damaged and that retaining pins are in place. When load permits, check, and at each loading, note operation of all box sections, rack locking levers, chains, and latches. If trailer is not loaded, remove all dirt, gravel and other foreign material from ammunition rack floor plate cups. Carefully inspect ridge pole rope for fraying and wear, particularly

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at spring loop, and at point where rope contacts top of rear door and locking device. Inspect spring for tension and security. If trailer is loaded, see that ridge pole is in place and properly secured. Tarpaulin must be in good condition, and securely mounted or stowed.

(9) **ITEM 82, \*TIGHTEN.**

(a) Tighten any trailer, or limber, external assembly, or mounting nuts or screws, where inspection has indicated the necessity.

(b) *Weekly.* Tighten all trailer and limber wheel mountings, and axle flange nuts or cap screws; spring U-bolts, shackles and rebound clips; towing connections, or any other mounting or assembly nuts or screws indicated by inspection as necessary on a weekly, or mileage, basis.

(10) **ITEM 83, \*LUBRICATE AS NEEDED.**

(a) Lubricate limber trailer items such as shackles, hinges, and latches, control linkage, frictional joints or clevises, and any point where inspection indicates the necessity, according to Lubrication Order instructions (par. 18). Lubricate limber draw bar axle bearings. Clean and lubricate limber yoke block pin and pin bore in yoke block.

(b) *Weekly.* Lubricate all points on trailer and limber indicated on Lubrication Orders, Figures 45 and 46 as needing attention on a weekly, or mileage, basis.

(11) **ITEM 84, \*CLEAN VEHICLES.**

(a) Wipe off excess dirt and grease from entire exterior of trailer and limber.

(b) Wash trailer and limber when possible. If not possible, wipe off thoroughly. Inspect paint or camouflage pattern for rust or bright spots, which might cause reflections. See that all vehicle markings (unless covered for tactical reasons) are legible. **CAUTION:** *When vehicles are driven into water for washing, care must be taken to see that water or dirt does not get into wheel bearings, or brakes, or on electrical units or wiring.*

(12) **ITEM 85, \*TOOLS AND EQUIPMENT.**

(a) Check trailer tool and equipment On-vehicle Stowage Lists, paragraph 6, figures 9 and 11, to be sure all items are present. See that they are in good condition and properly mounted or stowed.

(b) *Weekly.* Clean all tools and equipment of rust, dirt, or excessive grease. Apply preservatives where necessary and possible. See that tools with cutting edges are sharp, and properly protected, and that all items are properly and securely mounted or stowed.

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The book says to run a car right  
You should keep every nut and bolt tight,  
But it's too much to hope  
That our brilliant Joe Dope  
Would obey - which produces this sight!





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Section IX

**SECOND ECHELON PREVENTIVE MAINTENANCE**

**24. SECOND ECHELON PREVENTIVE MAINTENANCE SERVICES.**

**a. Responsibility.** Regular scheduled maintenance inspections and services are a preventive maintenance function of the using arm, and are the responsibility of commanders of operating organizations.

(1) **FREQUENCY.** The frequency of the preventive maintenance services outlined herein is considered a minimum requirement for operation of vehicles. Under unusual operating conditions such as extreme temperatures, dusty, sandy, or wet terrain, it may be necessary to perform certain maintenance services more frequently.

(2) **FIRST ECHELON PARTICIPATION.** The drivers should accompany their vehicles and assist the mechanics while periodic second echelon preventive maintenance services are performed. Ordinarily the driver should present the vehicle for a scheduled preventive maintenance service in a reasonably clean condition; that is, it should be dry, and not caked with mud or grease to such an extent that inspection and servicing will be seriously hampered. However, the vehicle should not be washed or wiped thoroughly clean, since certain types of defects, such as cracks, leaks, and loose or shifted parts or assemblies are more evident if the surfaces are slightly soiled or dusty.

(3) **SOURCES OF ADDITIONAL INFORMATION.** If instructions other than those contained in the general procedures in step (4) or the specific procedures in step (5) which follow, are required for the correct performance of a preventive maintenance service or for correction of a deficiency, other sections of this technical manual pertaining to the item involved, or a designated individual in authority, should be consulted.

(4) **GENERAL PROCEDURES.** These general procedures are basic instructions which are to be followed when performing the services on the items listed in the specific procedures. *NOTE: The second echelon personnel must be thoroughly trained in these procedures so that they will apply them automatically.*

(a) When new or overhauled subassemblies are installed to correct deficiencies, care must be taken to see that they are clean, correctly installed, properly lubricated, and adjusted.

## SECOND ECHELON PREVENTIVE MAINTENANCE

(b) When installing new lubricant retainer seals, a coating of the lubricant should be wiped over the sealing surface of the lip of the seal. When the new seal is a leather seal, soak it in SAE 10 engine oil (warm if practicable) for at least 30 minutes. Then, the leather lip should be worked carefully by hand before installing the seal. The lip must not be scratched or marred.

(c) The general inspection of each item applies also to any supporting member or connection, and usually includes a check to see whether or not the item is in good condition, correctly assembled, secure, or excessively worn. The mechanics must be thoroughly trained in the following explanations of these terms:

1. The inspection for "good condition" is usually an external visual inspection to determine whether or not the unit is damaged beyond safe or serviceable limits. The term good condition is explained further by the following: not bent or twisted, not chafed or burned, not broken or cracked, not bare or frayed, not dented or collapsed, not torn or cut, not deteriorated.

2. The inspection of a unit to see that it is "correctly assembled" is usually an external visual inspection to see whether or not it is in its normal assembled position in the vehicle.

3. The inspection of a unit to determine if it is "secure" is usually an external visual examination, a wrench, hand-feel, or a pry-bar check for looseness. Such an inspection should include any brackets, lock washers, lock nuts, locking wires, or cotter pins used in assembly.

4. "Excessively worn" will be understood to mean worn close-to, or beyond, serviceable limits, and likely to result in a failure if not replaced before the next scheduled inspection.

(d) *Special Services.* These are indicated by repeating the item numbers in the columns which show the interval at which the services are to be performed, and show that the parts, or assemblies, are to receive certain mandatory services. For example, an item number in one or both columns opposite a TIGHTEN procedure, means that the actual tightening of the object must be performed. The special services include:

1. *Adjust.* Make all necessary adjustments in accordance with the pertinent section of this technical manual, special bulletins, or other current directives.

2. *Clean.* Clean units of the vehicle with dry-cleaning solvent to remove excess lubricant, dirt, and other foreign material. After the parts are cleaned, rinse them in clean solvent and dry them thor-

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oughly. Take care to keep the parts clean until reassembled, and be certain to keep dry-cleaning solvent away from rubber or other material which it would damage. Clean the protective grease coating from new parts since this material is not usually a good lubricant.

3. *Special Lubrication.* This applies either to lubrication operations that do not appear on the vehicle lubrication order, and to items that do appear on such orders, but should be performed in connection with the maintenance operations, if parts have to be disassembled for inspection or service.

4. *Serve.* This usually consists of performing special operations, such as draining and refilling units with oil, and cleaning or changing the air line filter or cartridge.

5. *Tighten.* All tightening operations should be performed with sufficient wrench torque (force on the wrench handle) to tighten the unit according to good mechanical practice. Use torque-indicating wrench where specified. Do not overtighten, as this may strip threads or cause distortion. Tightening will always be understood to include the correct installation of lock washers, lock nuts and cotter pins provided to secure the tightening.

(e) When conditions make it difficult to perform the complete preventive maintenance procedures at one time, they can sometimes be handled in sections, planning to complete all operations within the week if possible. All available time at halts and in bivouac areas must be utilized, if necessary, to assure that maintenance operations are completed. When limited by the tactical situation, items with Special Services in the columns, should be given first consideration.

(f) The numbers of the preventive maintenance procedures that follow are identical with those outlined on W.D., A.G.O. Form No. 461, which is the Preventive Maintenance Service Work Sheet for Wheeled and Half-Track Vehicles. Certain items on the work sheet that do not apply to this vehicle are not included in the procedures in this manual. In general, the numerical sequence of items on the work sheet is followed in the manual procedures, but in some instances there is deviation for conservation of the mechanic's time and effort.

(5) **SPECIFIC PROCEDURES.** The procedures for performing each item in the 1,000 mile (monthly) and 6,000 mile (six-month) maintenance procedures, whichever shall occur first, are described in the following chart. Each page of the chart has two columns at its left edge corresponding to the 6,000 mile and the 1,000 mile maintenance respectively. Very often it will be found that a particular procedure does not apply to both scheduled maintenances. In order to determine which procedure to follow, look down the column corresponding to the maintenance due, and wherever an item number appears, perform the operations indicated opposite the number.

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| MAINTENANCE |            |
|-------------|------------|
| 6,000-Mile  | 1,000-Mile |
| 1           | 1          |
| 5           | 5          |
| 10          | 10         |
| 12          | 12         |
| 13          | 13         |
| 34          | 34         |

### ROAD TEST

**NOTE:** *When the tactical situation does not permit a full road test, perform those items which require little or no movement of the vehicle. When a road test is possible, it should be for preferably 4, and not over 6, miles.*

**1 Before-operation Inspection.** Perform this inspection as outlined in paragraph 20.

**5 Trailer Brakes (Braking Effect, Feel, Side Pull, Noise, Chatter, Hand Air Control).** Operate trailer brakes at various speeds during road test.

**SERVICE BRAKES.** Apply brakes sufficiently to stop vehicle in minimum safe distance and observe their effectiveness, any pull to one side, unusual noise, or chatter. Pedal should have  $\frac{1}{4}$ - to  $\frac{5}{16}$ -inch clearance between pedal roller and plunger. Note any erratic action of trailer that might indicate uneven brake shoe pressure.

**PARKING BRAKE.** Apply trailer parking brake levers on a reasonable grade. Trailer parking brakes should hold the loaded trailer when in fully applied position.

**10 Unusual Noises (Attachments, Body, Wheels).** Be on the alert during road test for any noise from limber and trailer that may indicate loose or damaged attachments. Have assistant listen particularly for indications of loose wheel mountings, suspension units, or underinflated tires.

**12 Air Brake System Leaks.** Test trailer air brakes for leaks with air pressure at governed maximum. With all brakes applied and engine stopped, there should not be a noticeable drop in pressure within one minute. If any pressure drop occurs during this check, test system for leaks by soap suds method.

**13 Temperatures (Brake Drums, Hubs).** At completion of run, feel brake drums and hubs of both limber and trailer for abnormally high temperatures.

**34 Air Cleaners.** Inspect trailer brake line air filters to see if they are in good condition, securely mounted and connected, and not leaking. Clean and service according to Lubrication Order instructions, paragraph 18. Be sure gaskets are in place and all joints and air line connections are tight.

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| MAINTENANCE |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6,000-Mile  | 1,000-Mile |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 47          | 47         | <p><b>Tires and Rims (Valve Stems and Caps, Condition, Direction, Matching Spare Carrier).</b> Inspect both limber and trailer tires as follows:</p> <p><b>VALVE STEMS AND CAPS.</b> Observe if all valve stems are in good condition and in correct position, and if all valve caps are present, and installed securely. Do not tighten with pliers.</p> <p><b>CONDITION.</b> Examine all tires for cuts, bruises, breaks, and blisters. Remove embedded glass, nails, and stones. Look for irregular tread wear, watching for any sign of flat spots, cupping, feather edges, and one-sided wear. Remove tires worn thin at center of tread (or other unserviceable tires) and exchange for new or re-treaded tires. Any mechanical deficiencies causing such conditions should be determined and corrected or reported. Wheel positions of tires with irregular wear should be changed to even up wear.</p> <p><b>MATCHING.</b> With tires properly inflated, inspect them to see if they are matched according to overall circumference and type of tread.</p> <p><b>SPARE TIRE CARRIER.</b> See if spare tire carrier is in good condition and secure.</p> <p><b>RIMS.</b> See that all rims and their lock rings or flanges are in good condition and secure.</p> |
| 47          |            | <p><b>TIGHTEN.</b> Tighten all wheel mounting and flange nuts securely.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|             | 47         | <p><b>SERVE.</b> With limber and trailer tires properly inflated to 70 pounds (cool), check overall circumference of all tires including spares. They should not have differences in overall circumference exceeding the <math>\frac{3}{4}</math>-inch limits specified in current directives and bulletins. <i>NOTE: Spares must be matched properly and mounted for use on one of the road wheels at intervals not exceeding ninety days. A convenient time to do this is during these maintenance services.</i></p> <p><b>CAUTION:</b> <i>After performing the tire-matching service, do not reinstall wheels until wheel-bearing services are completed.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



## SECOND ECHELON PREVENTIVE MAINTENANCE

| MAINTENANCE |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6,000-Mile  | 1,000-Mile |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 48          |            | <p><b>Brakes (Drums, Dust Shields, Cams and Shafts).</b> Inspect trailer brakes and service as follows: Remove wheels. <i>NOTE: On 6,000-mile maintenance, several wheel bearing and brake items up to 52 are group services and overlap. Perform in best order for economy of time and orderly reassembly.</i></p> <p><b>DRUMS AND DUST SHIELDS.</b> Clean dirt and grease from drums and dust shields keeping dry-cleaning solvent away from linings. Examine drums and shields to see if they are in good condition, securely mounted, and if drums are excessively worn or scored.</p> <p><b>CAMS AND SHAFTS.</b> Examine cams and shafts, where they contact to see if they are excessively worn; if cam shafts operate freely in collar, and if shafts and collars are worn.</p> <p><b>TIGHTEN.</b> Tighten brake dust shield cap screws and hub to drum nuts securely.</p>                                                                                                                                                                                                                                                                                                                        |
| 49          |            | <p><b>Brake Shoes (Linings, Anchors, Springs).</b> With trailer wheels removed inspect linings to see if they are in good condition, tightly secured to brake shoes, in good wearing contact with drums, free of dirt or lubricant, and not excessively worn. See if shoes are in good condition, properly secured to anchors, guides and retracting springs, and that springs have sufficient tension to return shoes properly to released position. Thickness of lining at most worn point should be enough for at least 1,000 miles of service before rivet heads are likely to contact drums. If vehicle has been operated in deep water, mud or loose sand, examine carefully for damage. Replace lining if necessary. Clean and lubricate wheel bearings as described in paragraph 18. Adjust bearings according to paragraph 37.</p> <p><b>CLEAN.</b> Clean all dirt and grease from linings with wire brush, cloth, or compressed air.</p> <p><b>ADJUST.</b> After subsequent related items to 56 inclusive are completed, adjust shoes. If new linings have been installed, adjust by major method. Adjust slack adjusters so diaphragm push-rod travel is at minimum approximately 1 inch.</p> |

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| MAINTENANCE |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6,000-Mile  | 1,000-Mile |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 50          | 50         | <b>Radius Rods.</b> Inspect to see that rods are tight and adjusted so as to provide correct tracking explained in paragraph 70.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 51          | 51         | <b>Walking Beam (Mountings, Support Brackets, Brake Cylinder Carriers).</b> Inspect all items to see if they are in good condition, correctly assembled, and secure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 51          |            | <b>TIGHTEN.</b> Draw up all assembly or mounting nuts securely.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 52          | 52         | <b>Wheels (Bearings, Seals, and Nuts).</b> Inspect and service as follows:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 52          | 52         | <b>Wheels.</b> Inspect limber and trailer wheels to see if they are in good condition and secure.<br><br><b>BEARINGS AND SEALS.</b> Check for looseness of wheel bearing adjustment. Revolve wheels and listen for evidence of dry or damaged bearings. Inspect around flanges and brake dust shields for evidence of excessive lubricant.                                                                                                                                                                                                                                                                                               |
| 52          |            | <b>CLEAN.</b> Disassemble wheel bearings and trailer center cross axle and walking beam. Clean thoroughly in dry-cleaning solvent and examine bearings and bushings to see if they are in good condition; if machined surfaces they contact are in good condition, and if there is any excessive wear. Remove limber axle draw bar bearing caps and examine both bronze bearing backs and caps as described in paragraph 96, and adjust according to paragraph 97.                                                                                                                                                                       |
| 52          |            | <b>SPECIAL LUBRICATION.</b> When all of the related items are to the point where wheel bearings are to be reinstalled, lubricate bearings according to instructions on lubrication order and as follows: Take care to have all parts clean and dry, the hands clean, and use clean lubricant. The inside of the wheel hub, and hub cap or hub flange, and outside of spindle or axle should be wetted only to a thickness of $\frac{1}{16}$ -inch minimum with lubricant to retard rusting. Bearing should be either machine packed, or hand packed by kneading lubricant into all spaces in the bearings. Coat the cups or outer races, |

## SECOND ECHELON PREVENTIVE MAINTENANCE

| MAINTENANCE |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6,000-Mile  | 1,000-Mile |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|             |            | and the lips of the oil seals with lubricants, and install new lubricant retainer seals if necessary.                                                                                                                                                                                                                                                                                                                                                           |
|             |            | <b>CAUTION:</b> <i>Do not pack the large cavity in wheel hubs between wheel bearings with lubricant. To do so is to cause leakage past the seals.</i>                                                                                                                                                                                                                                                                                                           |
| 52          |            | <b>ADJUST.</b> After lubricating trailer center cross axle and bushings, reassemble walking beam and hub-and-drum assemblies into place, and adjust wheel bearings correctly according to paragraph 37.                                                                                                                                                                                                                                                         |
| 56          | 56         | <b>Springs (Clips, Leaves, U-Bolts, Hangers, and Shackles).</b> See if all items are in good condition, correctly assembled and secure. Spring clips and bolts should be in place; spring leaves should not be shifted out of their correct position. This may be an indication of a sheared center bolt. Note if deflection of both springs is normal and approximately the same. Check hangers for cracks and bolts for excessive wear by means of a pry bar. |
| 64          | 64         | <b>Hand Brake.</b> Inspect ratchet, pawl, and linkage for damage and looseness.                                                                                                                                                                                                                                                                                                                                                                                 |
| 70          | 70         | <b>Air Brake Reservoir.</b> See that reservoir is in good condition and secure. Drain off water and close drain cock.                                                                                                                                                                                                                                                                                                                                           |
| 75          | 75         | <b>Stub Axles.</b> Inspect the four stub axle assemblies to see if they are in good condition, correctly and securely assembled to walking beam, and in proper alinement.                                                                                                                                                                                                                                                                                       |
| 77          | 77         | <b>Springs.</b> Inspect springs for damage or sag, and see that they are secure. Be sure that clips and saddles are in place and secure.                                                                                                                                                                                                                                                                                                                        |
| 80          | 80         | <b>Frame (Side and Crossmembers).</b> Inspect trailer and limber frames, brackets, side rails, trailer floor plate, and crossmembers to see if they are in good condition, secure, and correctly alined. If a misalignment is apparent, report condition.                                                                                                                                                                                                       |
| 81          | 81         | <b>Wiring, Conduit, and Grommets.</b> Observe these items alongside body of trailer to see if they are in good condition, properly supported, connected, and secure.                                                                                                                                                                                                                                                                                            |

## TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

| MAINTENANCE |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6,000-Mile  | 1,000-Mile |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 83          | 83         | <b>Brake Linings (Fittings and Hose).</b> Examine all lines and fittings and air brake hose on both trailer brake hose on both trailer and limber to see if they are in good condition, securely connected, and supported so lines or hose will not chafe against other vehicle parts. Remove trailer air brake relay valve, clean thoroughly with brake fluid, and reinstall securely.                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 85          | 85         | <b>Vehicle Lubrication.</b> Lubricate all points of vehicle in accordance with instructions in vehicle Lubrication Order, paragraph 18, omitting only those items which have received attention in the foregoing specific procedures. Replace missing or damaged lubrication fittings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 89          | 89         | <b>Tractor-to-trailer Brake Hose, Wiring, and Connections.</b> Check brake hose and wiring connections to see that they are in good condition and securely fastened to clips, springs, and brackets so that they will not chafe or interfere with working parts. Check trailer brake shut-off valves to see that they operate properly. <i>NOTE: Always moisten rubber seals or gaskets before connecting couplings.</i>                                                                                                                                                                                                                                                                                                                                                                                            |
| 90          | 90         | <b>Trolley Hoist (Sheaves, Ratchet, Brakes, Cross Head, Chain Guide and Chain).</b> Inspect chain hoist for good condition, correct assembly and security. Check hook at cross head to see if it is serviceable and turns and swivels freely. Note whether or not the three lubrication fittings are present and serviceable. Examine load and hand chains carefully to assure that all links are serviceable and not damaged. Inspect lift hook for excessive bearing wear or looseness and proper swiveling. Check hand and load chain sheaves for excessive wear. See that trolley wheels turn freely and are not excessively worn or fractured. Inspect trolley wheel axles for wear and be sure they are secure in frame. Inspect lifting clevis eye and supporting cross pin for serviceability and security. |
| 90          |            | <b>CLEAN AND SERVE.</b> Inspect hoist chains for broken, bent, badly worn, or cracked links, and for rusty spots. Clean entire length of chains with cloth satu-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## SECOND ECHELON PREVENTIVE MAINTENANCE

| MAINTENANCE |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6,000-Mile  | 1,000-Mile |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|             |            | rated with very thin oil or kerosene. After cleaning, wipe chain dry and return hoist and trolley to proper stowage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 91          | 91         | <b>Lamps (Light) (Tail, Body, Stop, and Blackout).</b> Operate all trailer switches and note if lamps respond. Include stop and blackout lights. Examine all trailer lights to see if they are in good condition and securely mounted, and if lenses are clean.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 92          | 92         | <b>Safety Reflectors.</b> See if they are all present, in good condition, clean, and secure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 100         | 100        | <b>Body.</b> Inspect units such as platforms, braces, stowage compartments, brackets, floor plates, and doors to be sure they are in good condition, correctly assembled, and securely mounted. Inspect hinged box sections of ammunition racks for damage. If loaded, see that rack locking levers are in good condition and that chain locks are tight and properly latched. See that hinge tubes are straight and not damaged, and that retaining pins are in place. When load permits, check and, at each loading, note operation of all box sections, rack locking levers, chains, and latches. Carefully inspect ridge pole rope for fraying and wear, particularly at spring loop, and at point where rope contacts top of rear door and locking device. Inspect spring for tension and security. |
| 101         | 101        | <b>Pintle Hook.</b> Examine pintle hook to see if it is in good condition and securely mounted to frame. Test pintle and latch to see if they operate properly; are adequately lubricated; and if lock pin is present and securely attached by chain. Pay particular attention for broken spring or worn draw bar.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 103         | 103        | <b>Paint and Markings.</b> Examine paint of entire trailer and limber to see if it is in good condition, paying particular attention to any bright spots in finish that might cause glare or reflection. Inspect vehicle markings and identification for legibility. Include identification plates and their mountings, if furnished.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 124         | 124        | <b>Tow Hitch.</b> Inspect draw bar lunette eye, to see if it is in good condition, secure, and not excessively worn.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |



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| MAINTENANCE |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6,000-Mile  | 1,000-Mile |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|             |            | <b>TIGHTEN.</b> Tighten all assembly and mounting nuts securely.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 124         | 124        | <b>Towing Bracket.</b> Examine towing bracket unit on limber to be sure it is in good condition, and correctly assembled. Tighten all accessible friction surfaces including lunette and eye bolt assemblies for condition and excessive wear. If attached, disconnect trailer, clean yoke pin and yoke thoroughly, inspect for damage and relubricate according to instructions in Lubrication Order, paragraph 18. Inspect limber towing bracket spindle for good condition and excessive wear. Be sure all safety chains are present and secure. |
| 125         | 125        | <b>Air Connections.</b> Inspect trailer air line connections to truck and/or limber to be sure they are in good condition, not excessively worn, and will couple securely without leaking.                                                                                                                                                                                                                                                                                                                                                          |
| 127         | 127        | <b>Landing Gear (Front Supports).</b> Examine legs, dolly, and hinge pins to see if they are in good condition, secure, and not excessively worn.                                                                                                                                                                                                                                                                                                                                                                                                   |
| 127         |            | <b>TIGHTEN.</b> Draw up all assembly and mounting nuts securely.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 131         | 131        | <b>Tools.</b> Inspect trailer standard and special tools, and trailer special loading and securing equipment, to see if they are all present (refer to vehicle stowage list, paragraph 6 and 7), in good condition, clean, and properly stowed or securely mounted.                                                                                                                                                                                                                                                                                 |
| 134         | 134        | <b>First Aid Kit (If Specified).</b> See if it is in good condition, and that all of its items are present and properly packed. Report any deficiencies immediately.                                                                                                                                                                                                                                                                                                                                                                                |
| 135         | 135        | <b>Publications and Form No. 26.</b> The trailer and equipment manuals, Lubrication Order and Standard Form No. 26 (Accident Report Form), and Form No. 478 (MWO and Major Unit Assembly Replacement Record), should be present, legible, and properly stowed.                                                                                                                                                                                                                                                                                      |
| 141         | 141        | <b>Modifications (MWO's Completed).</b> Inspect vehicle to determine if all Modification Work Orders have been completed, and entered on Form No. 478.                                                                                                                                                                                                                                                                                                                                                                                              |

## TROUBLE SHOOTING

| MAINTENANCE |            |
|-------------|------------|
| 6,000-Mile  | 1,000-Mile |
| 142         | 142        |

**Final Road Test.** Make a final road test rechecking applicable items 2 to 14 inclusive. Confine this road test to the minimum distance necessary to make satisfactory observations. **NOTE:** *Correct, or report, all deficiencies found during final road test.*

### Section X

## TROUBLE SHOOTING

### 25. GENERAL.

a. The following paragraphs provide information and suggest tests to assist in determining the causes of the more common troubles which may develop in use under average conditions. Each symptom of trouble, given under the individual unit or system, is followed by a list of possible causes of the trouble. Where pertinent, a test to isolate the possible cause is shown after that cause. Frequently, the test is the remedy for the trouble. When no test is given, the remedy is shown alone.

### 26. BRAKING SYSTEM.

#### a. No Brakes.

(1) **SOURCE OF AIR SUPPLY SHUT OFF AT TOWING VEHICLE.** Open cutout cocks at rear of towing vehicle.

(2) **AIR JUMPER HOSE BETWEEN TRUCK AND TRAILER NOT PROPERLY COUPLED.** Make certain air jumper hose tagged "Service" is coupled to connections on trailer tagged "Service". Service line coupling is on the left side of trailer.

(3) **LOW BRAKE LINE PRESSURE.** Check air pressure gage on towing vehicle. Pressure must not be below 60 pounds.

(4) **RESERVOIR DRAIN COCK OPEN.** Close drain cock on reservoir.

#### b. One or More Brakes Running Hot.

(1) **IMPROPER ADJUSTMENT.** Adjust brakes (par. 41 b).

(2) **RETURN SPRING BROKEN IN DRUM.** Replace spring (par. 42 b).

(3) **BINDING CAMSHAFT, ANCHOR PINS OR CHAMBER ROD END PIN.** Lubricate (par. 18) or disassemble to make needed repairs or replacements.

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(4) **BENT CHAMBER PUSH ROD.** Replace brake chamber (par. 51).

(5) **DRUM OUT OF ROUND.** Replace drum (par. 36).

**c. Slow Brake Application or Slow Release.**

(1) **LOW BRAKE LINE PRESSURE.** Check air supply at towing vehicle, refer to vehicle Technical Manual or TM 9-1827A.

(2) **EXCESSIVE TRAVEL IN CHAMBER PUSH ROD.** Adjust brakes (par. 41 b).

(3) **DIRTY AIR CLEANERS.** Clean air cleaners (par. 46).

(4) **RESTRICTION IN TUBING.** Look for kinked or dented tubing. Replace or repair (par. 52).

(5) **LACK OF LUBRICATION.** Lubricate anchor pin, cams, slack adjuster, mounting bracket, and chamber push rod pin (par. 18).

**d. Drop in Air Pressure.**

(1) **EXCESSIVE LEAKAGE IN RELAY-EMERGENCY VALVE EXHAUST PORT.** Worn check valve body, replace relay-emergency valve (par. 47).

(2) **AIR LEAKAGE AT TUBING CONNECTORS.** Tighten connector bodies and nut until leak disappears or replace connector assembly (par. 52).

(3) **EXCESSIVE LEAKAGE AT SERVICE LINE OR EMERGENCY LINE HOSE COUPLINGS.** Damaged packing ring in hose coupling. Replace rubber gasket or coupling.

(4) **EXCESSIVE LEAKAGE AT SERVICE LINE COUPLING WHEN JUMPER HOSE IS DISCONNECTED.** Dirty or worn inlet valve, replace relay-emergency valves (par. 47).

(5) **EXCESSIVE LEAKAGE AT EMERGENCY LINE COUPLING WHEN JUMPER HOSE IS DISCONNECTED.** Defective check valve disk or defective diaphragm. Replace relay-emergency valves (par. 47).

**e. Intermittent Brakes.**

(1) **GREASE ON LINING.** Caused from overlubricating of anchor pins, camshaft, or wheel bearing. Replace lining (par. 42 b).

(2) **BRAKE OUT OF ADJUSTMENT.** Adjust brakes (par. 41 b).

(3) **SCORED BRAKE DRUM.** Replace drum (par. 42 b).

(4) **IMPROPER LINING.** Replace shoes (par. 42 b).

(5) **WHEEL BEARINGS OUT OF ADJUSTMENT.** Adjust wheel bearing (par. 37).

**f. Brakes Do Not Release.**

(1) **BRAKE SYSTEM IMPROPERLY CONNECTED FROM TOWING VEHICLE.** Connect lines properly (par. 8 b).

(2) **BRAKE CONTROL IN THE APPLIED POSITION AT TOWING**

## **TROUBLE SHOOTING**

**VEHICLE.** If trailer is coupled to towing vehicle, place the control in the released position. If trailer is disconnected from towing vehicle, open drain cock at reservoir.

(3) **RELAY-EMERGENCY VALVE IN EMERGENCY POSITION.** Build up pressure in towing vehicle brake system or open drain cock at reservoir.

(4) **CUT-OUT COCKS CLOSED ON TOWING VEHICLE.** Open cut-out cocks.

(5) **RESTRICTION IN TUBING OR HOSE.** Check all tubing and hose (par. 52).

### **g. Parking Brakes Do Not Hold.**

(1) **DEFECTIVE PAWL AND RATCHET.** Replace lever assembly (par. 43).

(2) **GREASE ON REAR BRAKE LININGS.** Replace shoes (par. 42 b).

## **27. SUSPENSION.**

### **a. Shifted Spring Leaves.**

(1) **BROKEN SPRING CENTER BOLTS.** Replace spring center bolt.

(2) **CLIP BOLTS MISSING OR BROKEN.** Replace or repair.

(3) **LOOSE U-BOLTS.** Tighten U-bolts.

### **b. Uneven Riding.**

(1) **BROKEN SPRING LEAVES.** Replace spring leaves or spring (par. 71).

(2) **UNEVEN LOAD DISTRIBUTION.** Distribute load evenly.

(3) **SPRING HAS LOST ITS ARCH.** Replace spring (par. 71).

### **c. Excessive Noise.**

(1) **WORN PINS, WALKING BEAM BUSHINGS OR CENTER CROSS AXLE SPINDLES.** Replace with new parts (pars. 62, 67 and 68).

(2) **WORN RADIUS ROD SHACKLE OR LINK.** Replace worn parts.

(3) **LOOSE SPRING CLIPS OR RADIUS RODS.** Tighten.

### **d. Over Flexible.**

(1) **BROKEN SPRING LEAVES.** Replace broken leaves or spring (par. 71).

(2) **SPRING REBOUND CLIPS BROKEN.** Replace spring or leaves mounting rebound clips.

## **28. AXLES AND WALKING BEAM.**

**a. Trailer Wheels Not Tracking with Those of Dolly or Towing Vehicle.**

(1) **CENTER CROSS AXLE OUT OF ALINEMENT.** Place axle in alinement (par. 69).

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(2) **STUB AXLE OUT OF ALINEMENT.** Replace walking beam (par. 61).

**b. Uneven Tire Wear.**

(1) **CROSS AXLE HAS IMPROPER CAMBER.** Check axle camber (par. 69), if not correct, replace axle (par. 67).

(2) **BENT AXLE SPINDLE.** Check axle for bend (par. 69). Replace axle (par. 67).

(3) **ONE STUB AXLE BENT.** Replace walking beam.

**c. All Four Tires Show Uneven Wear and Cupping.**

(1) **AXLE OUT OF ALINEMENT.** First check axle for bend (par. 69). If not bent, place axle in alinement (par. 69).

(2) **BENT AXLE.** Check axle for bend (par. 69). If bent, replace axle (par. 67).

**d. Excessive Noise.**

(1) **STUB AXLE LOOSE.** Tighten.

(2) **WALKING BEAM BUSHINGS WORN.** Replace walking beam.

**29. LANDING GEAR.**

**a. Operating Crank Hard to Turn.**

(1) **LACK OF LUBRICATION OR IMPROPER LUBRICANT USED.** Lubricate according to Lubrication Order (par. 18).

(2) **BENT CRANK SHAFT.** Replace or straighten (par. 73).

(3) **LOWER LEG BENT CAUSING BIND IN UPPER LEG.** Replace landing gear (par. 73).

(4) **BEVEL GEAR WORN.** Remove bevel gear cover from right and left upper legs, and inspect gears. Replace (par. 73).

(5) **SCREW BENT.** Replace landing gear (par. 73).

**b. Landing Gear Does Not Respond When Turning One Crank.**

(1) **BOLT MISSING IN CRANK SHAFT OR IN BEVEL GEAR SHAFT.** Replace bolts.

(2) **WOODRUFF KEY SHEARED IN BEVEL GEAR SHAFT.** Replace Woodruff key (par. 123 c).

(3) **FEATHER KEYS SHEARED IN SCREWS.** Replace feather keys (par. 123).

**30. WHEELS, HUBS, AND TIRES.**

**a. Wobbly Wheel.**

(1) **LOOSE WHEEL STUD NUTS.** Tighten (par. 36).

(2) **INNER OR OUTER WHEEL BEARINGS BURNED OUT.** Replace wheel bearings (par. 36).



## **TROUBLE SHOOTING**

(3) **BENT AXLE.** Check axle for bend (par. 69).

(4) **BENT WHEEL.** Replace wheel (par. 36).

### **b. Hot Wheel Hub.**

(1) **LACK OF LUBRICATION.** Lubricate (par. 18).

(2) **DAMAGED BEARING OR CUP.** Replace bearing (par. 36 a (2) ), or bearing cup (par. 36 b (2) ).

(3) **IMPROPER WHEEL BEARING ADJUSTMENT.** Adjust wheel bearings (par. 37).

### **c. Undue Tire Wear.**

(1) **OVER- OR UNDER-INFLATION.** Inflate tires to 70-pound pressure.

(2) **OVERLOADING OR IMPROPER LOAD DISTRIBUTION.** Load to rated capacity, or distribute load evenly.

(3) **TIRE TROUBLE.** See axle trouble shooting (par. 28).

### **d. Oil or Grease in Brake Drum or Outside of Wheel.**

(1) **DEFECTIVE GREASE RETAINER.** Replace retainer (par. 36 c (3) ).

(2) **CRACKED HUB.** Replace hub (par. 36 a (2) and d (1) ).

(3) **IMPROPER OR OVERLUBRICATION.** Relubricate (par. 18).

## **31. LIMBER TOWING BRACKET SPINDLE.**

### **a. Excessive Lash or End Play Between Spindle and Axle.**

(1) **SPINDLE WORN.** Replace the spindle (par. 95).

(2) **SPINDLE BUSHINGS IN AXLE EXCESSIVELY WORN.** Check the bushings (par. 95).

(3) **SPINDLE LOOSE VERTICALLY IN ITS MOUNTINGS.** Tighten spindle nut.

### **b. Uncoupling Difficulties.**

(1) **YOKE BLOCK PIN BINDING IN YOKE BLOCK.** Tap pin out of yoke block, clean, and lubricate (par. 13 b (3) ).

## **32. ELECTRICAL SYSTEM.**

### **a. Lights Will Not Burn.**

(1) **JUMPER CABLE NOT PLUGGED INTO TRAILER FROM TOWING VEHICLE.** Install jumper cable.

(2) **LIGHT SWITCH AT TOWING VEHICLE IN THE "OFF" POSITION.** Turn switch on.

(3) **BATTERY AT TOWING VEHICLE NOT SUFFICIENTLY CHARGED.** Check battery on towing vehicle.

(4) **NO CURRENT FROM TOWING VEHICLE.** Check wiring on towing vehicle.

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(5) **BROKEN OR DAMAGED WIRES.** Check wiring system for broken or damaged wires. Replace or repair.

(6) **LAMPS NOT SERVICEABLE.** Check and replace (par. 83).

(7) **BLACKOUT SWITCH DEFECTIVE.** Replace switch (par. 87).

**b. Dim Light.**

(1) **DIRTY OR CORRODED CONTACT BLADES IN COUPLING SOCKET OR JUMPER CABLE.** Clean the blades.

(2) **DIRTY LENS.** Clean lens.

(3) **BATTERY AT TOWING VEHICLE NOT SUFFICIENTLY CHARGED.** Check battery (TM 9-812).

(4) **DIRTY OR CORRODED LAMP SOCKETS.** Remove lamp-unit and clean.

(5) **DIRTY OR CORRODED TERMINALS AT TOWING VEHICLE BATTERY.** Clean terminals.

**c. One or More Lights Will Not Burn.**

(1) **BURNED OUT LAMP-UNIT.** Replace lamp-unit (par. 84).

(2) **BROKEN WIRE.** Check wires for damage. Replace or repair.

(3) **DAMAGED LIGHT ASSEMBLY.** Replace light assembly (par. 84).

(4) **DIRTY OR CORRODED LAMP SOCKET.** Remove lamp-unit and clean.

**33. AMMUNITION RACKS.**

**a. Racks Do Not Meet Squarely in Center of Well.**

(1) **HINGE TUBE BENT.** Replace hinge tube (pars. 5, 77, and 78).

(2) **TRAILER BODY SPRING.** Notify higher authority.

(3) **ONE OR MORE SHELLS OUT OF POSITION.** Be sure all shells are setting squarely in cups and that cups are clean.

(4) **CENTER POST NOT SECURED.** Install or tighten bolt (par. 10 d (6)).

**b. Rack Locking Lever Operation Unsatisfactory.**

(1) **LOCKING LEVER BENT.** Replace lever.

(2) **HINGE TUBE BENT.** Replace hinge tube (pars. 76, 77 and 78).

(3) **RACKS NOT PROPERLY CLOSED.** Aline shells and close racks.

(4) **TRAILER BODY OUT OF ALINEMENT.** Notify higher authority.

**34. TROLLEY HOIST.**

**a. Chains Stick or Cling to Sheaves.**

(1) **CHAIN LINK OR LINKS DEFORMED.** If hand chain, replace chain and sheave (par. 80). If load chain, notify higher authority.

(2) **SHEAVES AND CHAIN GUMMED OR DIRTY.** Carefully clean

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chains and sheaves with dry-cleaning solvent. Allow to dry, and wipe with a cloth dampened with light engine oil.

### b. Brakes Defective.

(1) **BRAKES DO NOT HOLD LOAD.** Replace both the iron and the leather disk, ratchet disk, and pawl (par. 80).

(2) **BRAKES DO NOT RELEASE READILY.** Clean and inspect iron disk, leather disk, ratchet disk and pawl, and surface of hand sheave contacting iron disk. Replace rough, gouged, or broken parts (par. 80).

### c. Generally Rough Operation.

(1) **LOAD SHEAVE BEARINGS WORN.** Replace hoist.

(2) **SPUR GEARING WORN.** Replace hoist.

(3) **LACK OF LUBRICATION.** Lubricate according to Lubrication Order.

### d. Trolley Does Not Roll Freely.

(1) **TROLLEY WHEEL AXLES LOOSE.** Tighten.

(2) **LACK OF LUBRICATION.** Lubricate (par. 18).

(3) **TRACK ROUGH OR DIRTY.** Clean and smooth track.

(4) **TROLLEY WHEEL BEARINGS OR DEFECTIVE AXLES WORN.** Replace trolley.

## Section XI

## WHEELS, TIRES, HUBS, AND BEARINGS

### 35. DESCRIPTION AND DATA.

a. **Description** (figs. 53 and 141). The trailer wheels are 20 x 9.10 inches, offset, ventilated-disk type, and employ an R-type rim. Each wheel is secured to its hub by 10 studs and nuts. The nuts securing the right-hand wheels have right-hand threads. Left-hand wheel nuts have left-hand threads. Each hub rotates on two opposed tapered roller bearings. The outer bearing, secured by adjusting nut, locking washer, and lock nut, holds the hub and wheel assembly on the axle. The brake drum is assembled over the 10 wheel stud extensions on the inside of the hub flange, and is secured by 10 self-locking nuts. The tire equipment is 11.00 x 20 inches, and employs the Hiway tread design.

### b. Data.

#### (1) WHEELS.

|                       |                                  |
|-----------------------|----------------------------------|
| Make .....            | Budd                             |
| Type .....            | 20 x 9.10 offset ventilated disk |
| Rim .....             | R-type                           |
| Number of studs ..... | 10                               |
| Tread .....           | 88¾ in.                          |

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**Figure 51 — Walking Beam End Supported For Wheel Removal**

**(2) TIRES.**

Size ..... 11.00 x 20  
 Number of plies ..... 12  
 Air pressure carried ..... 70 lb  
 Tread ..... Hiway

**(3) WHEEL BEARINGS.**

Make ..... Timken  
 Type ..... Tapered-roller  
 Stock numbers:  
     Inner cup ..... H-12-62-04200  
     Inner cone ..... G-600-01-39900  
     Outer cup ..... H-12-62-04000  
     Outer cone ..... G-600-01-39899  
     Adjusting nut ..... G-136-03-14882  
     Locking washer ..... (Ordnance number) C67935  
     Locking nut ..... G-67-03-00740

## WHEELS, TIRES, HUBS, AND BEARINGS



RA PD 334922

**Figure 52 — Loosening Wheel Nuts Using Hand Impact Wrench**

### 36. WHEEL AND HUB ASSEMBLY.

#### a. Removal.

(1) **REMOVE WHEEL AND TIRE.** Apply parking brakes. **NOTE:** *If a rear wheel is to be removed, apply the parking brake on the opposite side of the vehicle. As soon as the wheel being removed is raised to the desired height, block front and rear of front wheel to secure trailer on side having no available parking brake. Place jack under end of walking beam as shown in figure 51. Elevate jack until just enough weight rests on wheel to prevent its turning. Use a hand impact wrench or socket with 3-foot extension handle and loosen the 10 wheel nuts (fig. 52). Leave the top and bottom nuts snug to support the wheel, and spin off eight other nuts (fig. 53). Raise jack until wheel can be turned freely. Support wheel, and remove the lower nut, and then the upper nut. Two men lift wheel straight off guide ring and studs.*

(2) **REMOVE HUB (fig. 141).** Remove the six cap screws and lock washers securing hub cap, and remove hub cap and gasket. Loosen, and remove, wheel bearing adjusting nut, lock nut, and locking washer. Remove adjusting nut. **NOTE:** *Before removing bearings, provide clean cloths or paper with which to wrap the parts to prevent contamination by dirt or sand. Pull hub out about an inch and then*

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RA PD 334946

**Figure 53 — Removing Wheel Nuts Top and Bottom Nuts Snug**

push back onto axle to free bearing cone. Remove outer cone. Remove hub with inner cone and grease seal.

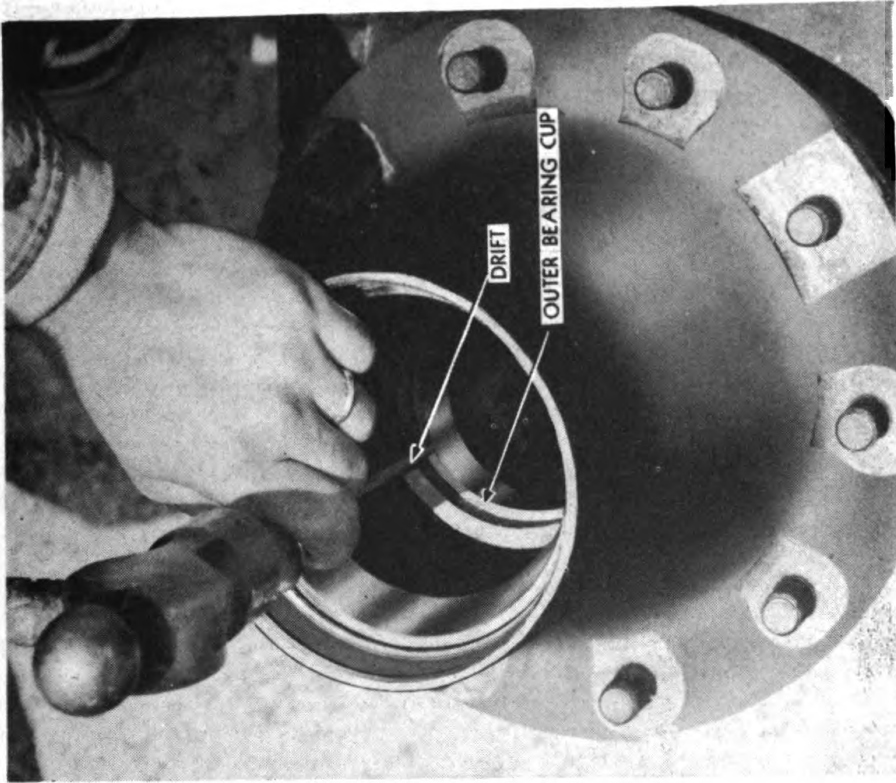
**b. Disassembly.**

(1) **REMOVE BRAKE DRUM.** Remove the 10 nuts securing the drum to the hub. *NOTE: These nuts are installed at assembly, using an impact wrench. To loosen, use a socket with a 3- or 4-foot extension handle. To hold the drum and hub assembly, turn the drum on edge and place a bar between the wheel studs contacting the ground or floor on the side toward the pull.* Pry drum off studs. Use a wood drift against inside edge of inner bearing cone and drive out cone and oil seal.

(2) **REMOVE BEARING CUPS (fig. 54).** Set hub on end and clean grease out of drift recesses (fig. 54). *NOTE: In some hubs the drift recesses are not present. In these cases, the hubs have been cast so that a drift can be used around the entire circumference of the cup.* Use a brass drift or piece of hardwood and drive alternately on each side of the bearing cup. Where the hub is not recessed, tap all the way around the cup. In either case, guard against cocking and



WHEELS, TIRES, HUBS, AND BEARINGS



RA PD 334952

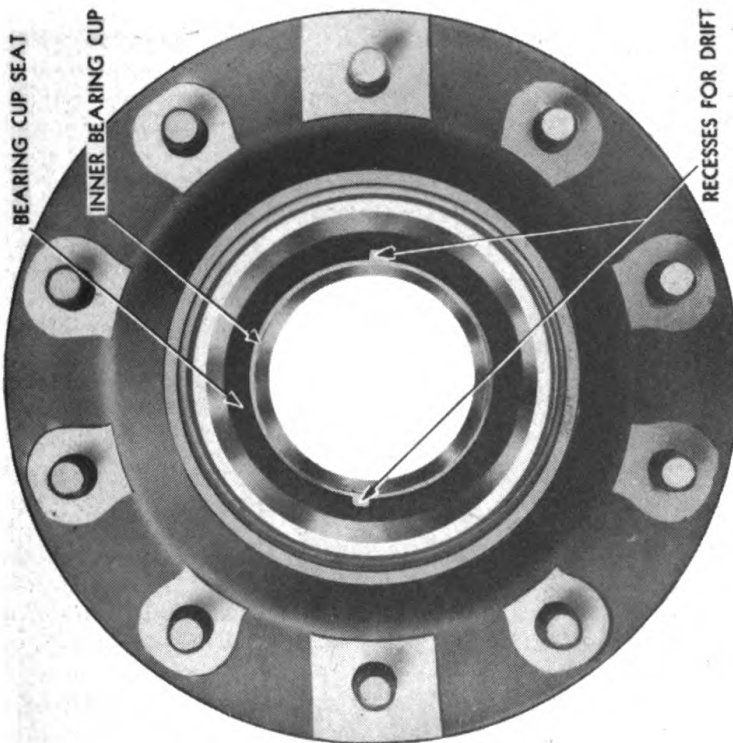


Figure 54 — Bearing Cup Removal

## TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

wedging the cup in the hub bore. Remove bearing cup. Reverse the hub, and remove the second bearing cup.

### c. Assembly.

(1) **INSTALL BEARING CUPS.** NOTE: *Figure 141 shows proper assembly sequence for parts which have been removed.* Remove all old grease from inside hub and clean hub bore with dry-cleaning solvent. Dry and place hub on wood block. Start new bearing cup square with the bore, having the smaller inside diameter placed so that it will be on the inside when cup is in place. Place a piece of hardwood over the cup face, and drive in cup until flush with outer edge of hub. Place old cup over the new one, and drive in new cup until it is absolutely tight with the cup bore flange. Be sure that new cup is properly seated, because if not, it will alter the distance between the bearing centers and prevent proper reassembly of the wheel. Swab the two bearing cups with general purpose grease.

(2) **INSTALL DRUM.** Place drum over studs on inside of hub, and install 10 self-locking nuts, and tighten.

(3) **INSTALL INNER BEARING CONE AND ROLLER ASSEMBLY AND OIL SEAL.** Clean inner bearing cone and roller assembly with dry-cleaning solvent. Dry and lubricate (par. 18). Slide inner bearing cone and roller assembly in bearing cup in hub. Insert oil seal and drive into place with hardwood block over face until flush with rim of hub.

### d. Installation.

(1) **INSTALL HUB AND DRUM ASSEMBLY.** Remove all old grease from axle spindle, and clean spindle with dry-cleaning solvent. Slide hub and drum assembly over spindle and push assembly into position on axle.

(2) **INSTALL OUTER BEARING CONE AND ROLLER ASSEMBLY.** Clean outer bearing cone and roller assembly. Lubricate bearing (par. 18). Slide outer bearing cone and roller assembly on axle spindle, and install in outer cup of hub.

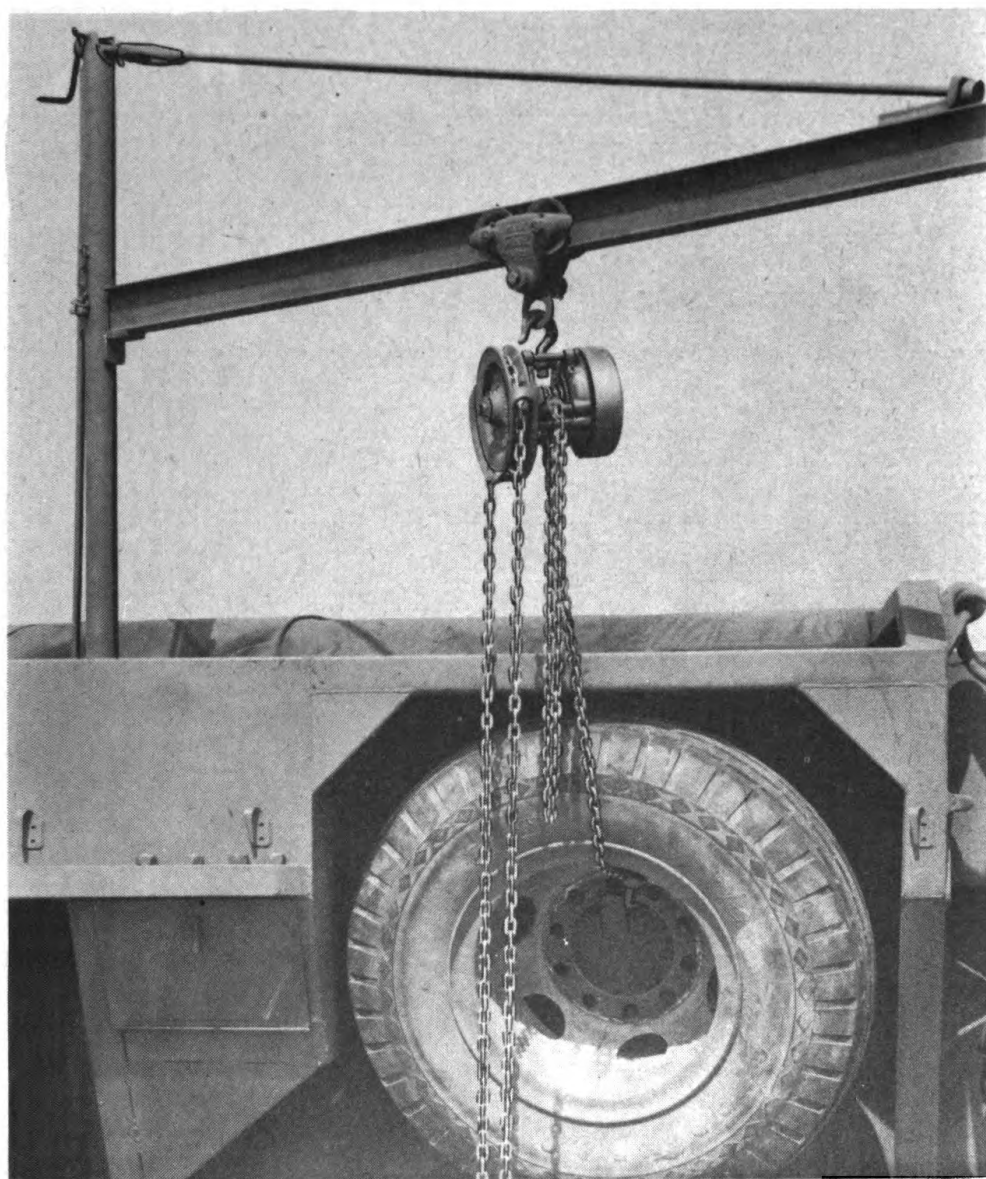
(3) **INSTALL AXLE NUT AND THRUST WASHER.** Install wheel bearing adjusting nut on axle. Install locking washer and lock nut.

(4) **INSTALL WHEEL AND TIRE ASSEMBLY.** Two men install wheel and tire assembly on hub. Install two opposite wheel nuts and draw up snug. Lower wheel until it can be turned. Install balance of nuts, and tighten all nuts.

## 37. BEARING ADJUSTMENT.

a. Jack up end of walking beam until wheel is free of ground. If bearing being adjusted is in a rear wheel, block front wheel on that side and release the parking brake fully so that there is absolutely

# WHEELS, TIRES, HUBS, AND BEARINGS

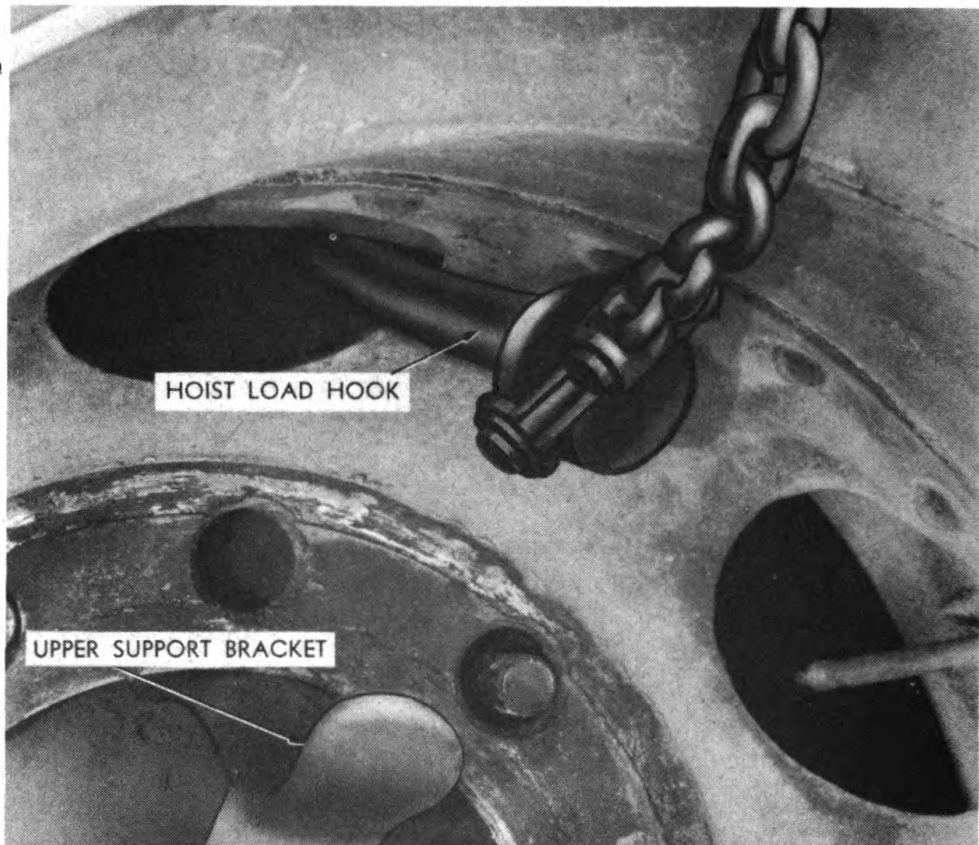


RA PD 334944

**Figure 55 — Use Of Trolley Hoist In Spare Wheel Removal and Installation**

no drag on the brake drum. Remove hub cap. Remove locking nut and washer. Tighten bearing adjusting nut until a drag is felt on revolving wheel, and then slack off on nut until wheel is free. Test for excessive lash in bearings. Standing directly in front of wheel, rest one end of wheel hub wrench handle on floor under tire, and lift up on tire. By working wrench handle up and down, while holding one finger on outer bearing cone, excessive bearing-play can be quickly detected. When adjustment is correct, install lock washer and locking

**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)**



RA PD 334942

**Figure 56 — Lifting Wheel From Studs To Upper Support Bracket**

nut. Draw locking nut up tightly and try adjustment again. Install hub cap and gasket. Lower wheel to ground and remove jack. **NOTE:** Bearings are adjustable for wear and their satisfactory operation and long life depend on proper adjustment and lubrication.

**38. SPARE WHEEL REMOVAL AND INSTALLATION.**

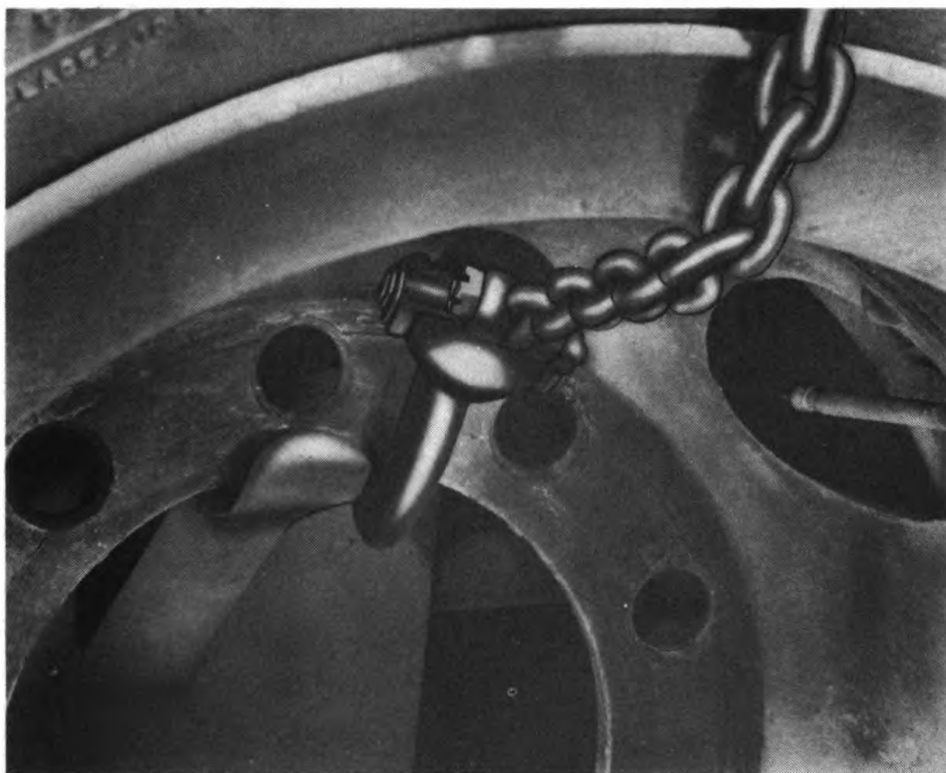
**a. Removal (figs. 55, 56 and 57).**

(1) **NOTE:** This assembly, because of its weight and placement on the vehicle, can best be handled by employing the vehicle trolley hoist. When the hoist is not used the removal and installation procedures are the same as far as the use of the upper and lower support brackets are concerned.

(2) Assembly trolley hoist (par. 15).

(3) Engage load hook in the uppermost perforation of the wheel disk (fig. 56). Raise load chain until it is snug but not placing a lifting strain on wheel. Remove the four nuts securing wheel to mounting bracket. Ease off on load chain enough to free wheel mounting studs. Control wheel as it swings from studs and lower it to the upper support bracket.

# WHEELS, TIRES, HUBS, AND BEARINGS



RA PD 334950

**Figure 57 — Lifting Wheel From Upper Support Bracket**

(4) Loosen load chain and engage load hook in wheel flange (figs. 55 and 57). Lift wheel off bracket with hoist, and guide the boom to the point where the wheel is to be used. Lower wheel to ground and disconnect hoist.

## **b. Installation.**

(1) Assemble trolley hoist (par. 15).

(2) Engage load hook in flange of wheel disk as shown in figure 57. **NOTE:** *The load chain and hook body will be on the inside of the wheel; the tip of the hook on the outside of the wheel.* Raise the wheel and traverse the crane to bring the wheel in front of the mounting bracket (fig. 55). Raise wheel until wheel flange is slightly above upper support bracket.

(3) Push wheel inward and lower onto upper support bracket as in figure 55. Position load hook in uppermost perforation in wheel disk. Raise wheel and push it inward over the four mounting studs. Hold wheel on studs and install one nut to support wheel. Disconnect hoist. Install the other three nuts, and tighten all four securely.

(4) Disassemble and stow trolley hoist (par. 15).

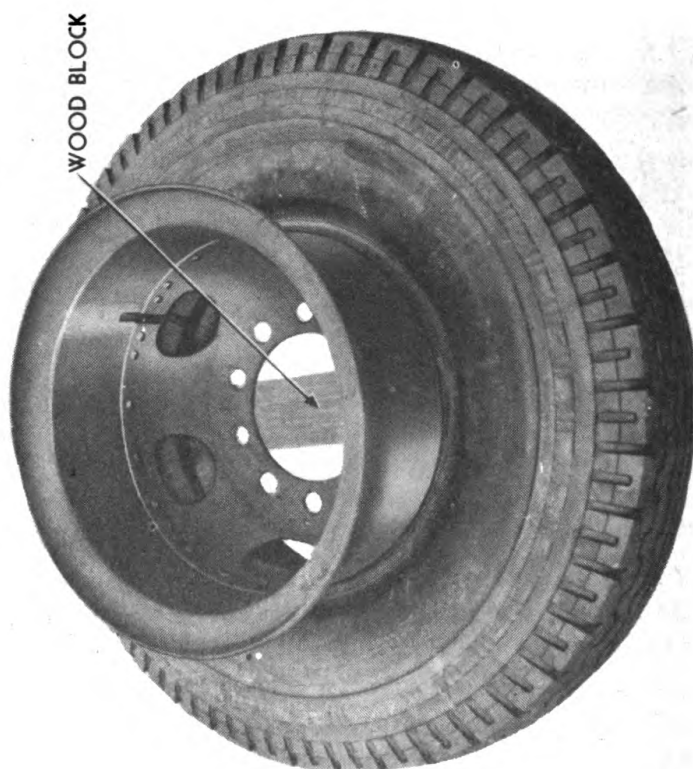


TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



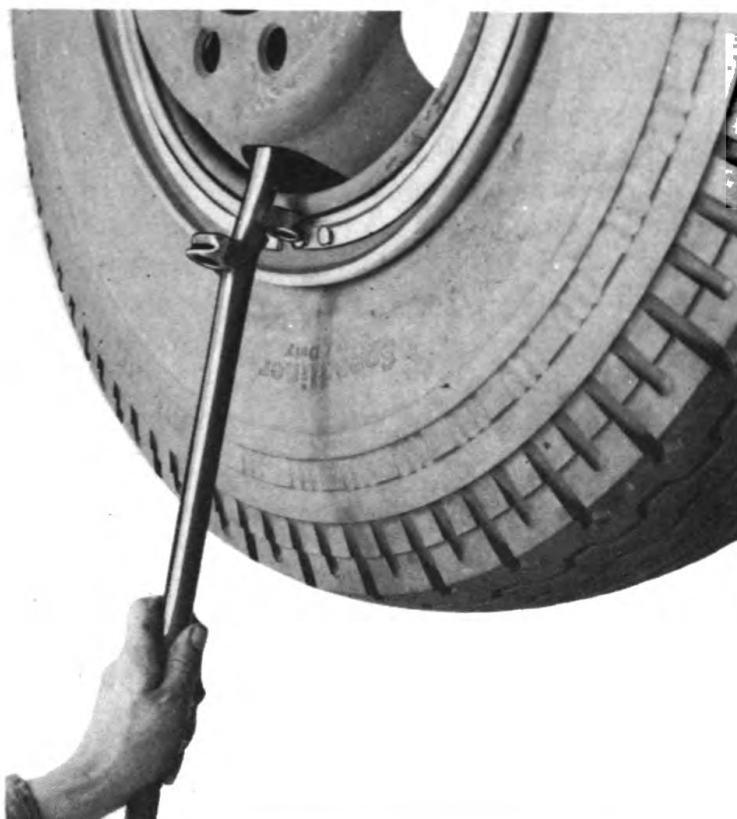
RA PD 334982

Figure 58 — Tire Removal

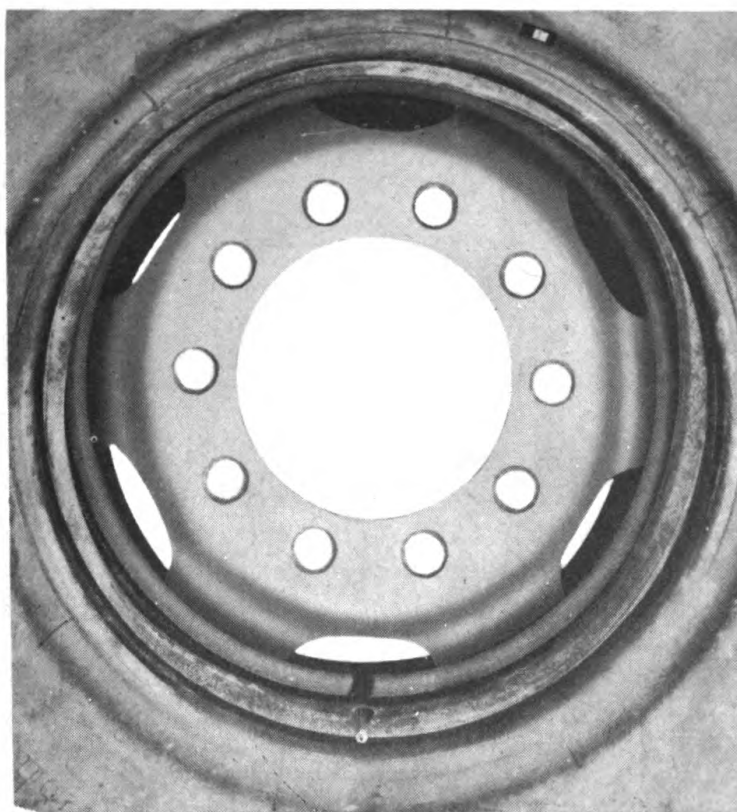




**WHEELS, TIRES, HUBS, AND BEARINGS**



**Figure 59 — Tire Installation**



**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)****39. TIRE AND INNER TUBE REPAIR.**

a. **Tire Removal** (fig. 58). Place wheel on floor or ground with locking ring up. Remove valve core to assure that no air remains in tire. Using tools similar to those shown at A, figure 58, depress bead lock rim, and start the locking ring out of groove. Remove bead lock rim. Reverse wheel and support at center so that the lower sidewall of the tire is about 10 inches above the ground. Use a rubber hammer and drive tire off wheel rim (fig. 58).

b. **Inner Tube Repair.** Clean the area around the hole or cut with flint paper or tool designed for the purpose. Apply rubber cement and allow it to dry. Apply a cold patch which will extend at least  $\frac{1}{4}$  inch outside the cut or hole in the tube. Apply pressure to patch for about 5 minutes.

c. **Tire Repair.** Refer an unserviceable casing to higher authority.

d. **Tire Installation** (fig. 59).

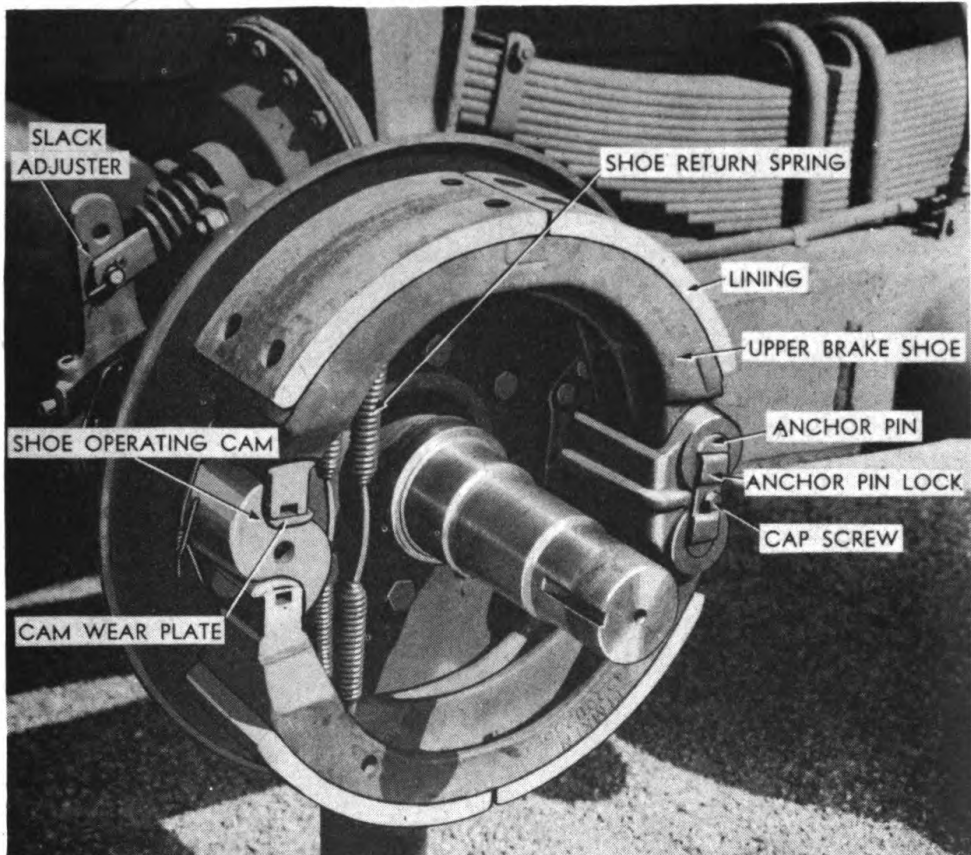
(1) Place tube in tire and inflate just enough to hold flap in place. Place tire over wheel rim as shown at A, figure 59. Place bead lock rim over tire. Depress bead lock rim and start locking ring into groove (B, fig. 59). Continue around tire until full circumference of locking ring is in groove. Inflate tube just sufficiently to press the casing outward against the bead lock ring. Use the rubber hammer against the sidewall of tire to assure that tire is exerting pressure on both sides of rim and that the locking ring is seated. As a safety precaution, inflate tube a little more and repeat the above. Inflate to 70 pounds. **CAUTION:** *When inflating the tire stand behind the tire or so that the locking ring is away from the personnel.*

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**Section XII****FOUNDATION BRAKE ASSEMBLY****40. DESCRIPTION AND DATA.**

a. **Description** (fig. 60). The brakes used on the trailer are the Timken, Model MPS 282. They are a two-shoe internal-expanding type employing fixed anchors and are actuated by an S-type cam cast integrally with the camshaft. Each brake assembly is supported by a dust shield bolted to a mounting flange at the walking beam ends. A slack adjuster, splined to the inner end of the camshaft, serves as an operating lever and provides a quick means of brake shoe adjustment. A compressed air system (par. 44) supplies the power for brake application.

# FOUNDATION BRAKE ASSEMBLY



RA PD 334931

**Figure 60 — Brake Assembly**

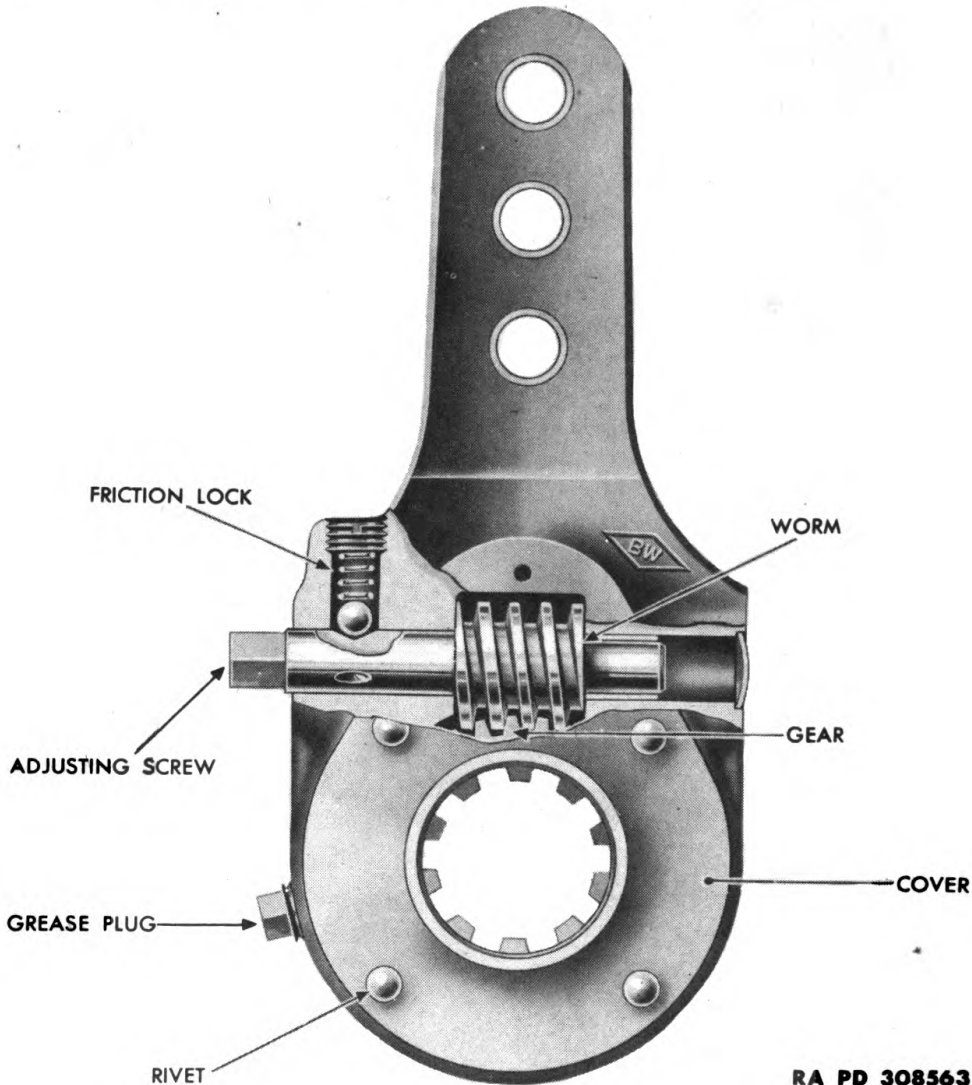
## b. Data.

Make ..... Timken  
Model ..... MPS 282  
Drum size ..... 17¼ x 5½ in.  
Lining width ..... 4 in.

### Manufacturer's Numbers:

Shoe assembly with linings R.H. .... UR-A30-3222-B210  
Shoe assembly with linings L.H. .... UR-A29-3222-B210  
Lining ..... TD-2240-N-506  
Lining bolts ..... TD-X1915  
Lining nuts ..... TD-X541  
Lining washers ..... TD-X529  
Slack adjuster ..... BWE-220269  
Camshaft, L.H. .... UR-2210-A-1821  
Camshaft, R.H. .... UR-2210-B-1822

## TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

**Figure 61 — Slack Adjuster — Sectional View****41. BRAKE ADJUSTMENT.**

a. **Inspection.** Jack up end of walking beam at the pertinent wheel. Open drain cock in reservoir to be certain all air is out of system. If a rear wheel, be sure parking brake lever is fully released. Pull slack adjuster arm (away from brake air chamber) as far as it will go and release quickly. Note whether or not it snaps back into position quickly. If the action is lazy, either the return springs are weak or the camshaft is binding in one, or both, of the two supports. These parts must be free before attempting a brake adjustment. Rotate wheel and note whether or not there is any drag on the drum

## FOUNDATION BRAKE ASSEMBLY

indicating binding parts, weak springs, or brake linings lacking sufficient clearance.

**b. Adjustment.** Rotate slack adjuster worm screw (figs. 61 and 67) clockwise until brakes drag. Then rotate shaft counterclockwise until wheel is free. This adjustment should provide an air chamber push rod travel of approximately 1 inch between the released and applied positions. This travel must never be less than  $\frac{3}{4}$  inch nor more than  $1\frac{1}{4}$  inches. When correctly adjusted, check to be sure that the worm adjusting screw is turned so that the friction lock is seated to maintain the adjustment. Turn the adjusting screw slightly in both directions, and listen for the click, or feel the over-center action, as the detent ball drops into place.

### 42. BRAKE ASSEMBLY COMPONENTS.

#### a. Slack Adjuster (fig. 61).

(1) **DESCRIPTION.** The slack adjuster is an adjustable brake operating lever. When actuated by the air chamber push rod, it rotates the camshaft, thereby applying the brakes. Its worm adjusting screw permits adjusting the lash between the air chamber diaphragm and the camshaft.

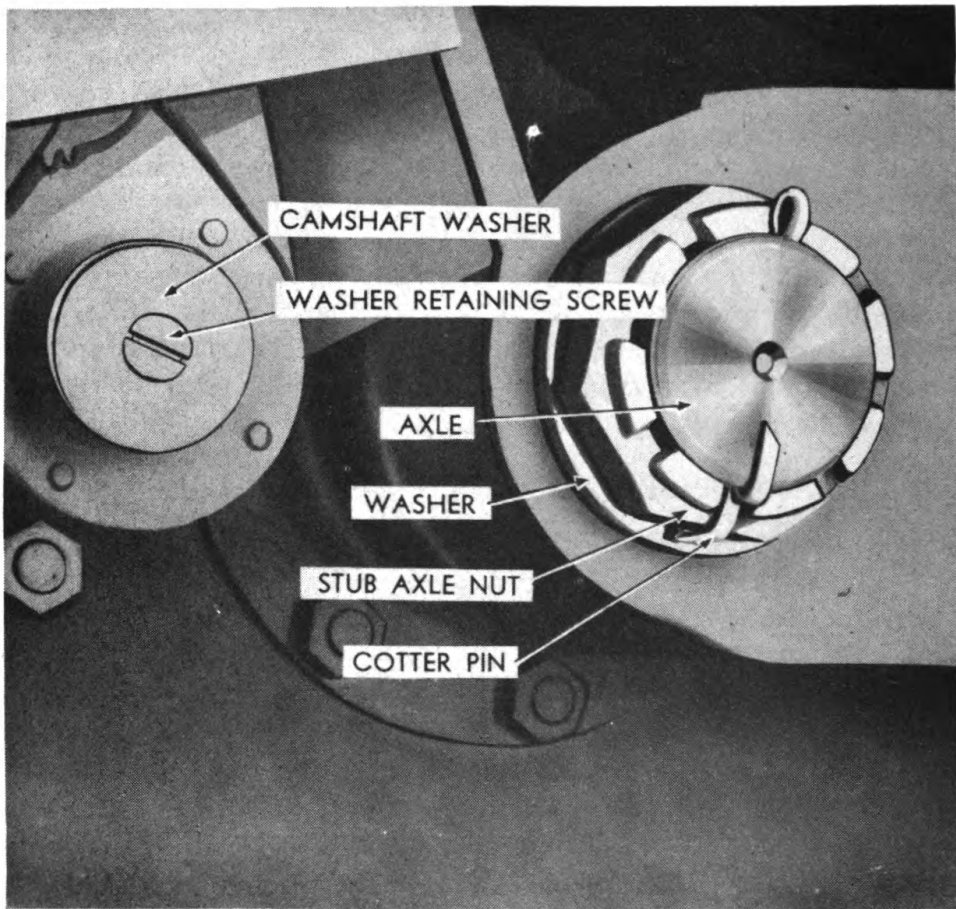
(2) **REMOVAL.** Open drain cock in reservoir to release all air from system. Remove cotter pin securing push rod yoke pin and remove the yoke pin. Rotate worm adjusting screw counterclockwise until slack adjuster arm is clear of push rod yoke. Remove screw and retaining washer from end of camshaft (fig. 62). Remove spacers and tap slack adjuster off splines. **NOTE:** *In the case of slack adjusters at rear wheels, rotate the slack adjuster 180 degrees; or so the arm is past bottom center. Doing this will provide the clearance needed to pass the parking brake lever.*

#### (3) INSTALLATION.

(a) **Front Adjuster.** Slide the front slack adjuster all the way onto the camshaft spline with the adjusting screw out, or facing away, from the air chamber, and the arm as nearly vertical as it can be and clear the push rod yoke. Install spacers, retaining washer and screw. Rotate adjusting worm screw as necessary to align upper hole in slack adjuster arm with the two holes in the push rod yoke (push rod in fully released position). Install yoke pin and cotter pin (fig. 67). Adjust brakes (par. 41).

(b) **Rear Adjuster.** Slide slack adjuster all the way onto spline with the arm pointing downward, and the parking brake lever fulcrum toward the center of the vehicle. Install spacers, retaining washer and screw. Rotate adjusting worm screw until lower hole in arm is aligned with the two holes in push rod yoke (push rod in fully released position). Install yoke pin and cotter pin. Adjust brake (par. 41).

## TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 334932

**Figure 62 — Stud Axle and Camshaft Inner Ends (Rear Wheel)**

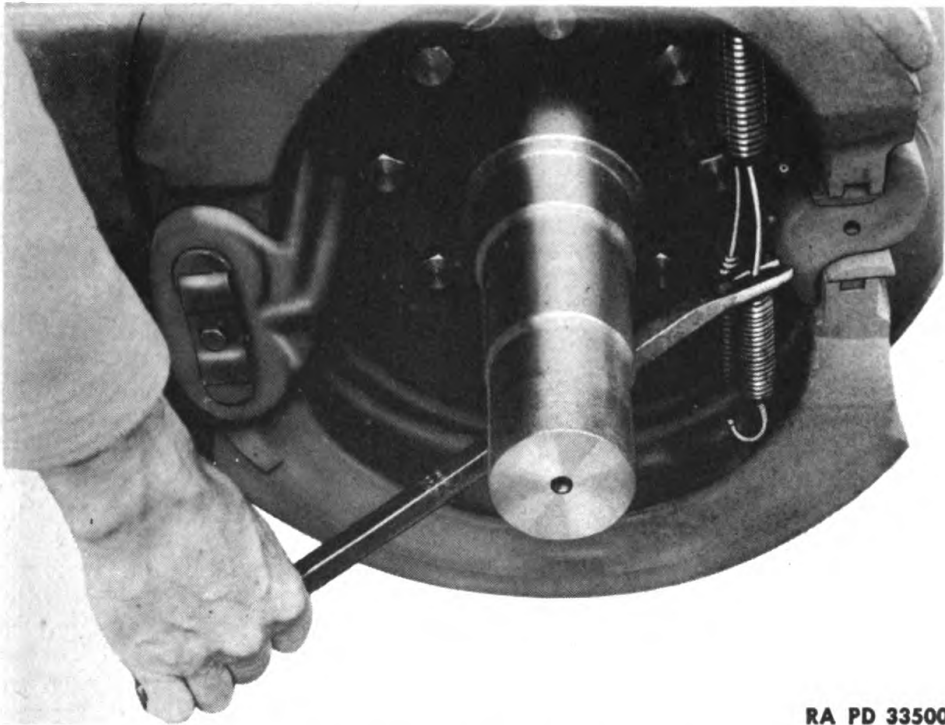
**b. Brake Shoes.**

(1) **REMOVAL.** Remove wheel assembly (par. 36). Remove hub and drum assembly (par. 36). Remove cap screw and lock washer securing anchor pin lock and remove lock (fig. 60). Remove lubrication fittings. Remove brake shoe return springs. If a tool similar to the one illustrated in figure 63 is not available, it can be made up easily by cutting a vee slot in one end of a  $\frac{3}{8}$ -inch or  $\frac{1}{2}$ -inch piece of square or round stock 16 or 18 inches long. Use a heavy offset or draglink screwdriver, and turn anchor pins counterclockwise out of the anchor pin nuts (fig. 64). Pull pins out and remove shoes.

(2) **INSPECTION.** Inspect anchor pins. Replace if scored or worn in excess of 0.015 inch. Inspect new shoes for presence, and security of cam wear plates and screws. See that lining blocks are secure and that toe and heel are properly beveled as shown in figure 64. Examine shoe return springs for tension, and spring pins for wear and tightness. Replace unserviceable parts.



## FOUNDATION BRAKE ASSEMBLY



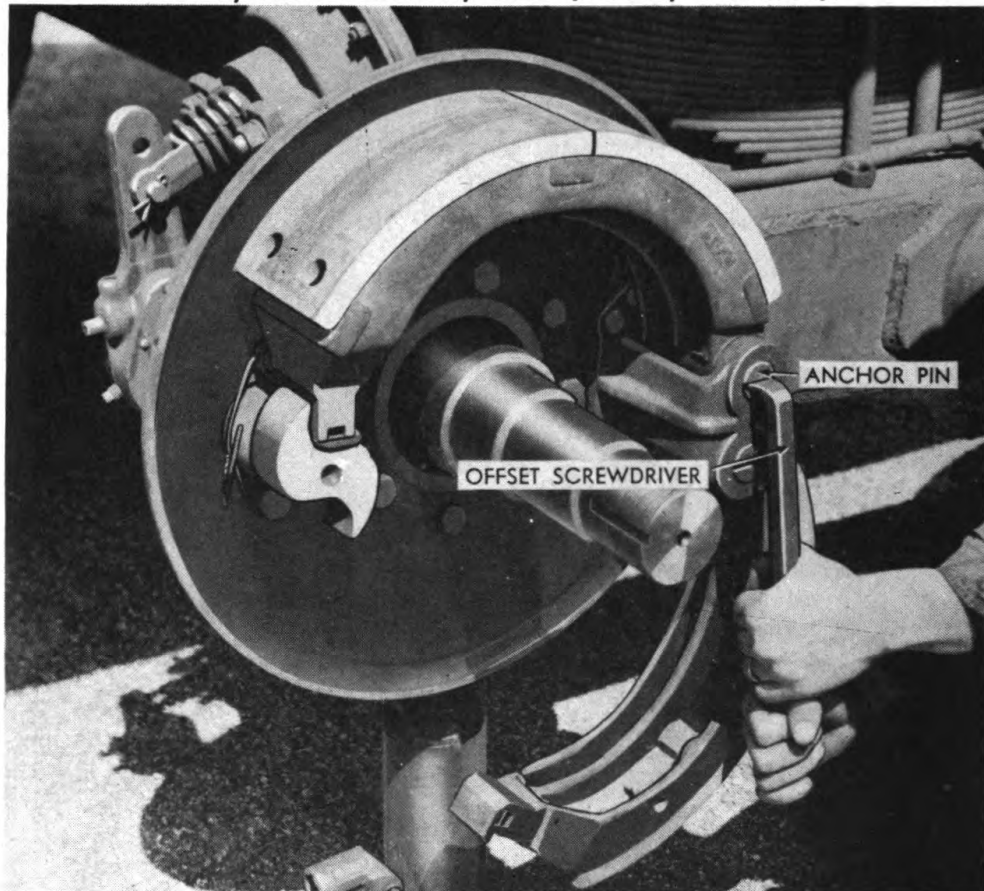
RA PD 335003

**Figure 63 — Removing Brake Shoe Return Spring**

(3) **INSTALLATION.** Aline upper brake shoe bushing between upper anchor pin bosses, and push threaded end of anchor pin through shoe bushing and dust shield. Install lock plate over threads of pin with the flat side toward the dust shield, and install the lock nut, (fig. 65). Screw the anchor pin into the nut but do not tighten. Aline lower hole in lock with hole in dust shield. Aline bushing in lower shoe with lower anchor pin bosses, and install the lower anchor pin, screwing it into the lower nut until tight. Tighten upper anchor pin. Turn anchor pin as needed to seat anchor pin lock in the slotted pin ends. Install anchor pin lock, and secure with cap screw and lock washer. Support lower shoe against flat of cam, and install brake shoe return springs. Install hub and drum assembly (par. 36 b (1) and par. 36 a (2) ). Check for free rotation of drum.

**NOTE:** *If there is any drag and brake is fully released, proceed as follows: Loosen brake drum inspection hole cover and swing it away from inspection hole (fig. 66). Insert a 0.020-inch thickness gage through hole between lining and drum. Rotate drum slowly to determine location of binding. Remove hub and drum and carefully grind off high spots. Install wheel (par. 36 d (4) ).*

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 334934

**Figure 64 — Removing Brake Shoe Anchor Pins**

**c. Camshaft.**

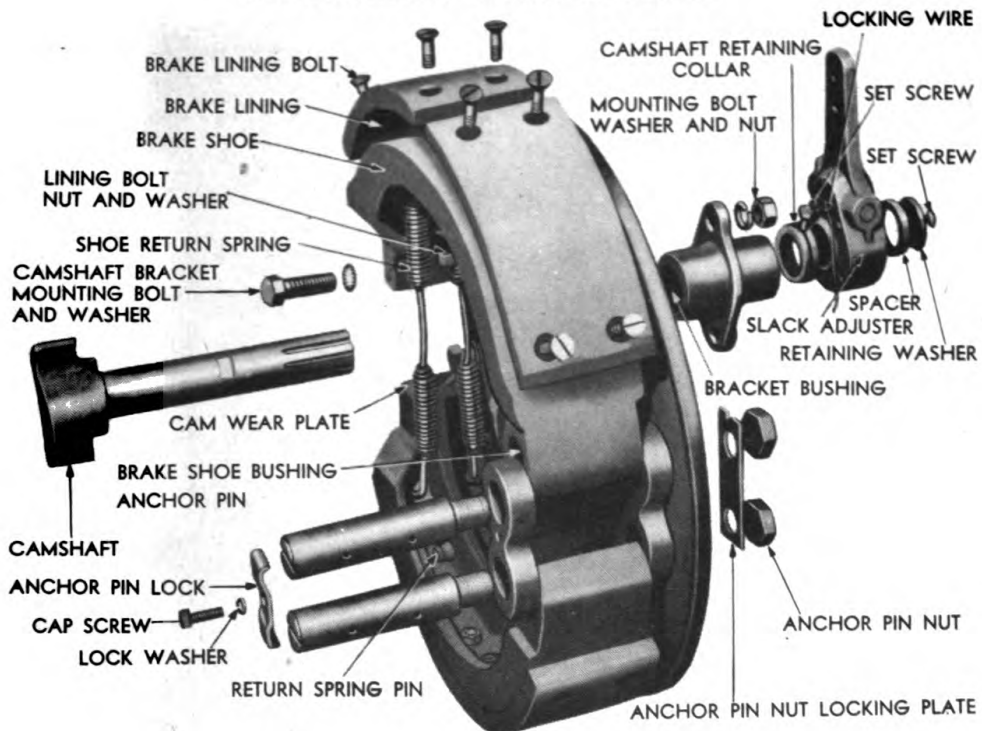
**(1) REMOVAL.**

- (a) *Remove Wheel.* Refer to paragraph 36 a (1).
- (b) *Remove Hub and Drum.* Refer to paragraph 36 a (2) and b (1).
- (c) *Remove Slack Adjuster.* Refer to paragraph 42 a (2).
- (d) *Remove Camshaft.* Cut locking wire securing camshaft collar set screw, and remove set screw (fig. 67). Remove brake shoe return springs allowing lower shoe to hinge downward. Hinge upper brake shoe away from cam, and pull camshaft straight out. Pick up collar, and install set screw.

**(2) INSTALLATION.**

- (a) *Position and Secure Camshaft.* Be sure that bracket bearing surfaces are serviceable and properly lubricated. Insert splined end of shaft just through support bracket in dust shield. With collar set screw removed, slide collar between the two supports, and push the

# FOUNDATION BRAKE ASSEMBLY



RA PD 335004

**Figure 65 — Assembly Sequence Foundation Brake Assembly**

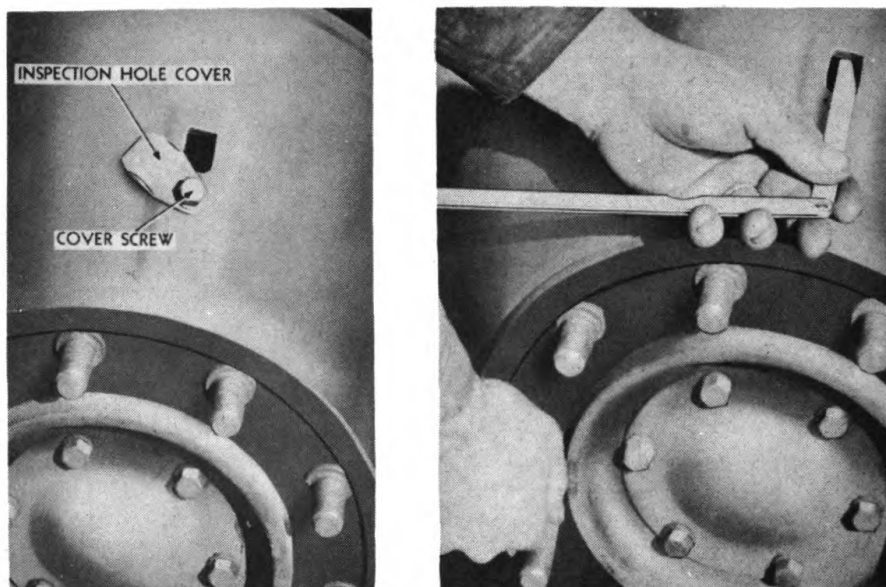
camshaft through the collar and on through the needle bearing in the outboard support bracket as far as it will go. Locate the milled surface (fig. 65) on the camshaft, directly under the hole in the cam-collar, and install collar set screw. Secure with safety wire as in figure 67.

- (b) *Install Slack Adjuster.* Refer to paragraph 42 a (3).
- (c) *Install Hub and Drum.* Refer to paragraph 36 d (1).
- (d) *Install Wheel.* Refer to paragraph 36 d (4).
- (e) *Adjust Brakes.* Refer to paragraph 41.

## **d. Camshaft Bracket.**

- (1) **REMOVAL.**
  - (a) *Remove Wheel.* Refer to paragraph 36 a (1).
  - (b) *Remove Hub and Drum.* Refer to paragraph 36 a (2) and
- b (1).**
  - (c) *Remove Slack Adjuster.* Refer to paragraph 42 a (2).
  - (d) *Remove Brake Shoes.* Refer to paragraph 42 b (1).
  - (e) *Remove Camshaft.* Refer to paragraph 42 c (d).
  - (f) *Remove Bracket.* Remove the two nuts and lock washers from bracket mounting bolts. Pull bracket off of bolts and out of dust shield. If either of the mounting bolts are unserviceable, cut

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RA PD 335006

**Figure 66 — Checking Lining-to-drum Clearance**

the locking wire (fig. 68) and remove the bolts. If serviceable, these bolts and the locking wire need not be removed.

## (2) INSTALLATION.

(a) *Install Bracket.* **NOTE:** Check fit of camshaft in bracket bushing before installing bracket. If too tight, try another bracket. If loose in excess of 0.015 inch, replace the camshaft. Install bracket mounting bolts, and secure with locking wire as in figure 68. Hold bolt heads against dust shield, and place holes in bracket flange over inner ends of bolts. Hold bracket flange against dust shield, and install mounting bolt lock washers and nuts, and tighten.

(b) *Install Camshaft.* Refer to paragraph 42 c (2).

(c) *Install Slack Adjuster.* Refer to paragraph 42 a (3).

(d) *Install Brake Shoes.* Refer to paragraph 42 b (3).

(e) *Install Hub and Drum Assembly.* Refer to paragraph 36 d (1)

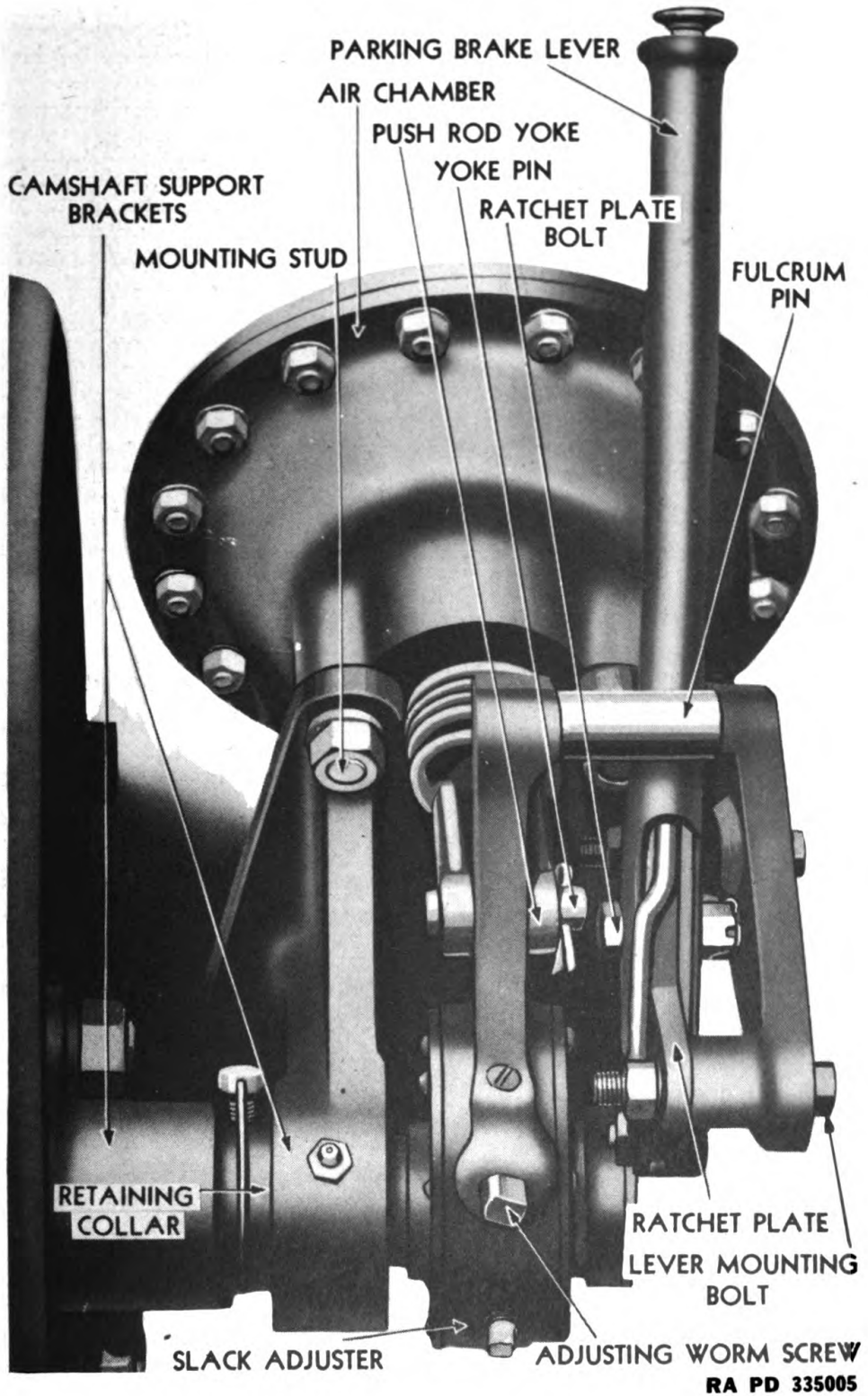
(f) *Install Wheel.* Refer to paragraph 36 d (4).

(g) *Adjust Brakes.* Refer to paragraph 41.

## e. Dust Shield (fig. 68).

(1) **REMOVAL.** Remove all parts and assemblies which were removed in subparagraph d (1) above and in the order shown. Then remove the eight bolts, nuts, and internal-toothed lock washers securing the dust shield to walking beam flange, and remove the dust shield.

# FOUNDATION BRAKE ASSEMBLY

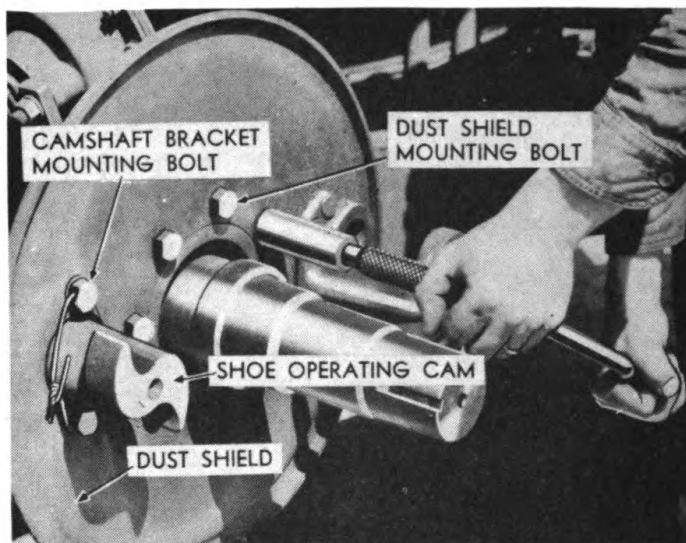


RA PD 335005

**Figure 67 — Rear Brake Control Group — Left Side**



TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 334930

**Figure 68 — Removing Dust Shield Camshaft In Place**

(2) **INSTALLATION.** Place dust shield on mounting flange in the position shown in figure 68. Install the eight mounting bolts, internal-toothed lock washers, and nuts and tighten. Install balance of brake assembly as described in subparagraph d (2) above and in the order shown. Adjust brakes (par. 41).

### 43. PARKING BRAKE.

a. **Description** (fig. 67). The parking brake is composed of two hand levers, each mounted on an extension of the two rear air chamber brackets. As the hand lever is pulled rearward, it contacts a pin welded to the top of the slack adjuster arm and pulls the slack adjuster rearward applying the brake. A pawl and ratchet maintain the lever in its applied position.

b. **Brake Lever Removal.** Apply parking brake. Use a wood block between slack adjuster arm and air chamber to retain arm in the applied position. Release parking brake lever. Remove the two bolts, nuts, and internal-toothed lock washers securing brake lever ratchet plate. Remove parking brake lever assembly.

c. **Brake Lever Installation.** Block slack adjuster as in subparagraph b above. Position parking brake lever assembly as shown in figure 67, with pawl and rod toward the rear. Install the two mounting bolts, and secure with nuts and internal-toothed lock washers.



### Section XIII

## AIR BRAKE SYSTEM

### 44. DESCRIPTION AND DATA.

a. **Description.** The air brake equipment on the ammunition trailer provides remotely controlled power braking and is adaptable for use with any heavy tractor, truck, or prime mover similarly equipped. An air compressor on the towing vehicle supplies compressed air through flexible hoses to the air lines, reservoir valves, and air chambers on the trailer (fig. 69). The air chambers convert the energy of the compressed air into the mechanical force required for brake application. The use of air storage reservoirs and quick action valves on both towing vehicle and trailer helps keep the air pressure equalized throughout the system.

#### b. Data.

- |     |                                  |                     |
|-----|----------------------------------|---------------------|
| (1) | Brake air chamber assembly ..... | Bendix Westinghouse |
|     | Stock number .....               | 0850-216218         |
| (2) | Relay-emergency valve .....      | Bendix Westinghouse |
|     | Stock number .....               | 0850-220353         |
| (3) | Air filter .....                 | Bendix Westinghouse |
|     | Stock number .....               | D24-02-01881        |
| (4) | Exhaust check valve .....        | Bendix Westinghouse |
|     | Stock number .....               | D24-02-01882        |
| (5) | Reservoir drain cock .....       | Bendix Westinghouse |
|     | Stock number .....               | H6-01-00805         |
| (6) | Cut-out cock .....               | Bendix Westinghouse |
|     | Stock number .....               | G-160-01-39647      |

### 45. SYSTEM TESTS.

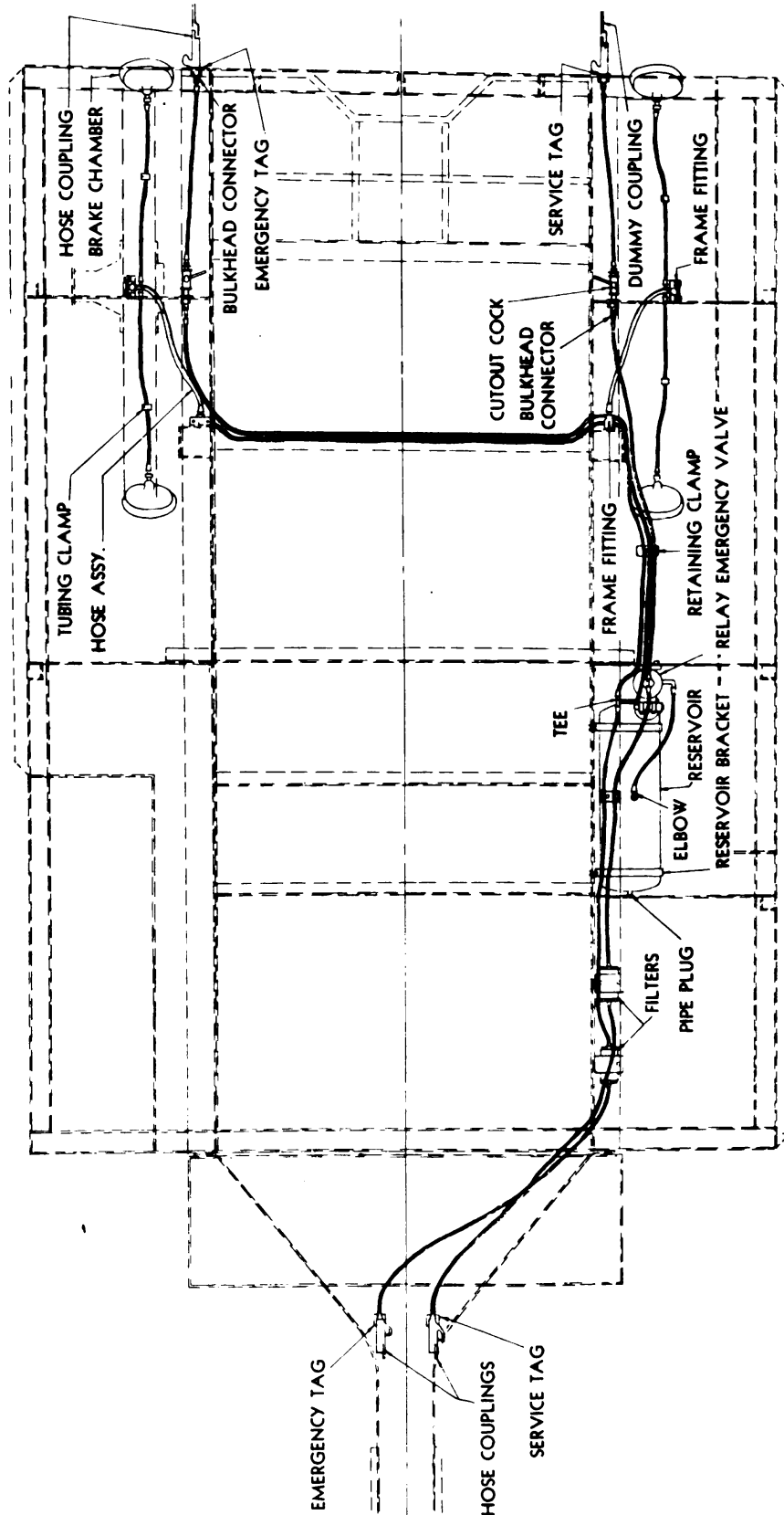
a. **Preparation.** In order to test the trailer air brake system for serviceability, connect the trailer air brake system to the air brake system of a tractor. Start the engine, if necessary, to charge both air brake systems to 100 pounds as registered by the dash gage on the tractor.

#### b. Leakage Tests.

(1) With the motor stopped and brakes released, observe the rate of drop in air pressure registered by the dash gage on the tractor. The rate of drop in air pressure should not exceed 3 pounds per minute.

(2) With engine stopped and brakes fully applied, observe the rate of drop in air pressure registered by the dash gage. The rate of drop in air pressure should not exceed 4 pounds per minute.

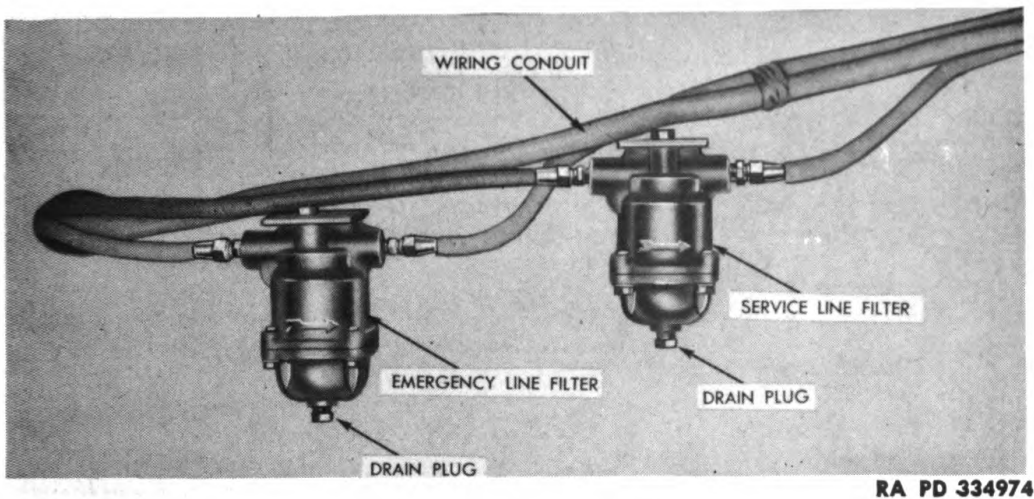
TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 335007

Figure 69 — Air Brake System

## AIR BRAKE SYSTEM



**Figure 70 — Brake Air Filters**

(3) Leakage in either of the above tests is the combined leakage in the air brake system on the tractor and the air brake system on the trailer. Leakage in the trailer air brake system may be determined by comparing the leakage in the above tests with the leakage found in similar tests with the cut-out cocks in the hose lines connecting the tractor to the trailer closed.

(4) If leakage in either of the above tests is excessive, check all devices and connections for leakage by coating with soap suds, and repair, or replace, the leaking device or connection.

### c. Operating Tests.

(1) With vehicle moving, apply the brakes and check their effectiveness. Check for quick braking response during application and release of the brakes.

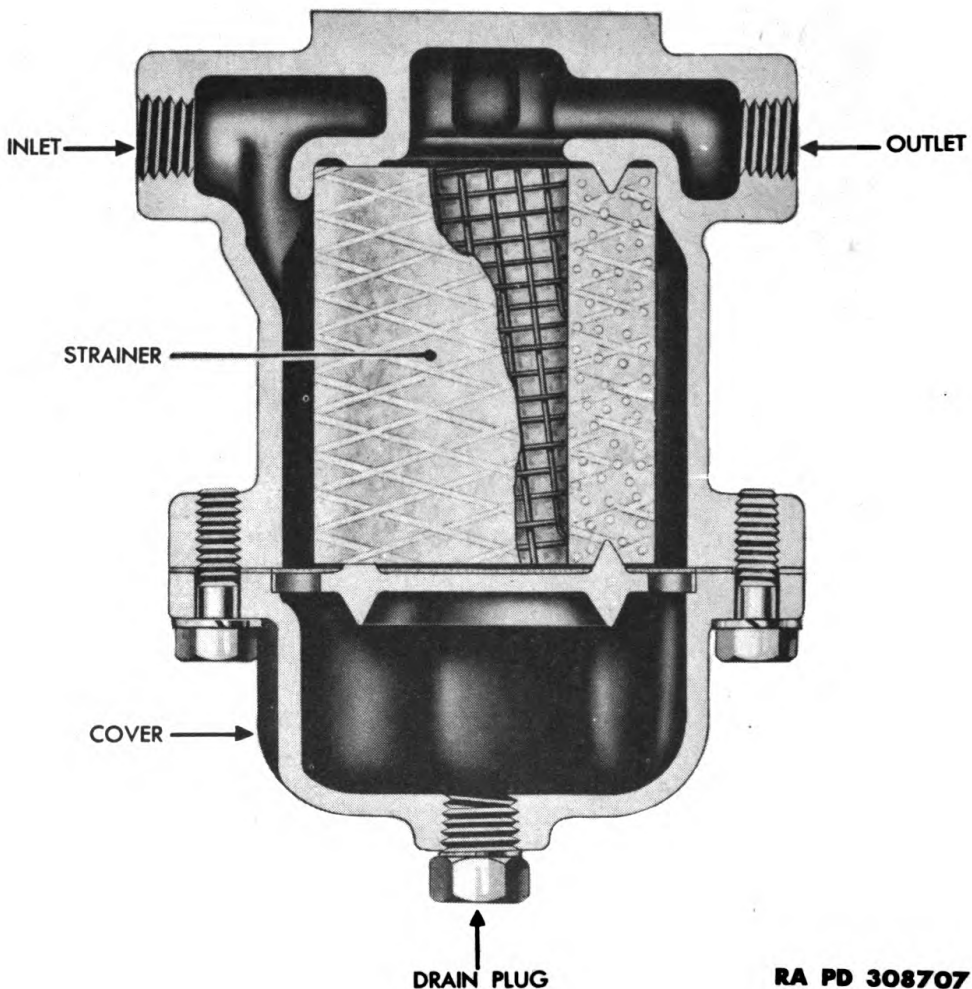
(2) Check to be sure the brakes on all wheels apply, and release, properly.

## 46. AIR FILTERS (figs. 70, 71, and 72).

a. **General.** Air filters are employed in the service line and emergency line of the trailer. Their purpose is to trap dirt or other foreign material, which might get into the lines, when they are not connected to the lines on the towing vehicle. Both filters are fastened by cap screws to brackets welded to the left side of the trailer body (fig. 70). They are mounted ahead of the emergency-relay valve to prevent contamination of that valve.

b. **Draining of Filter (fig. 71).** Close the service and emergency cut-out cocks at rear of towing vehicle. Remove filter drain plugs. Open cut-out cocks on towing vehicle, and allow air to blow

## TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 308707

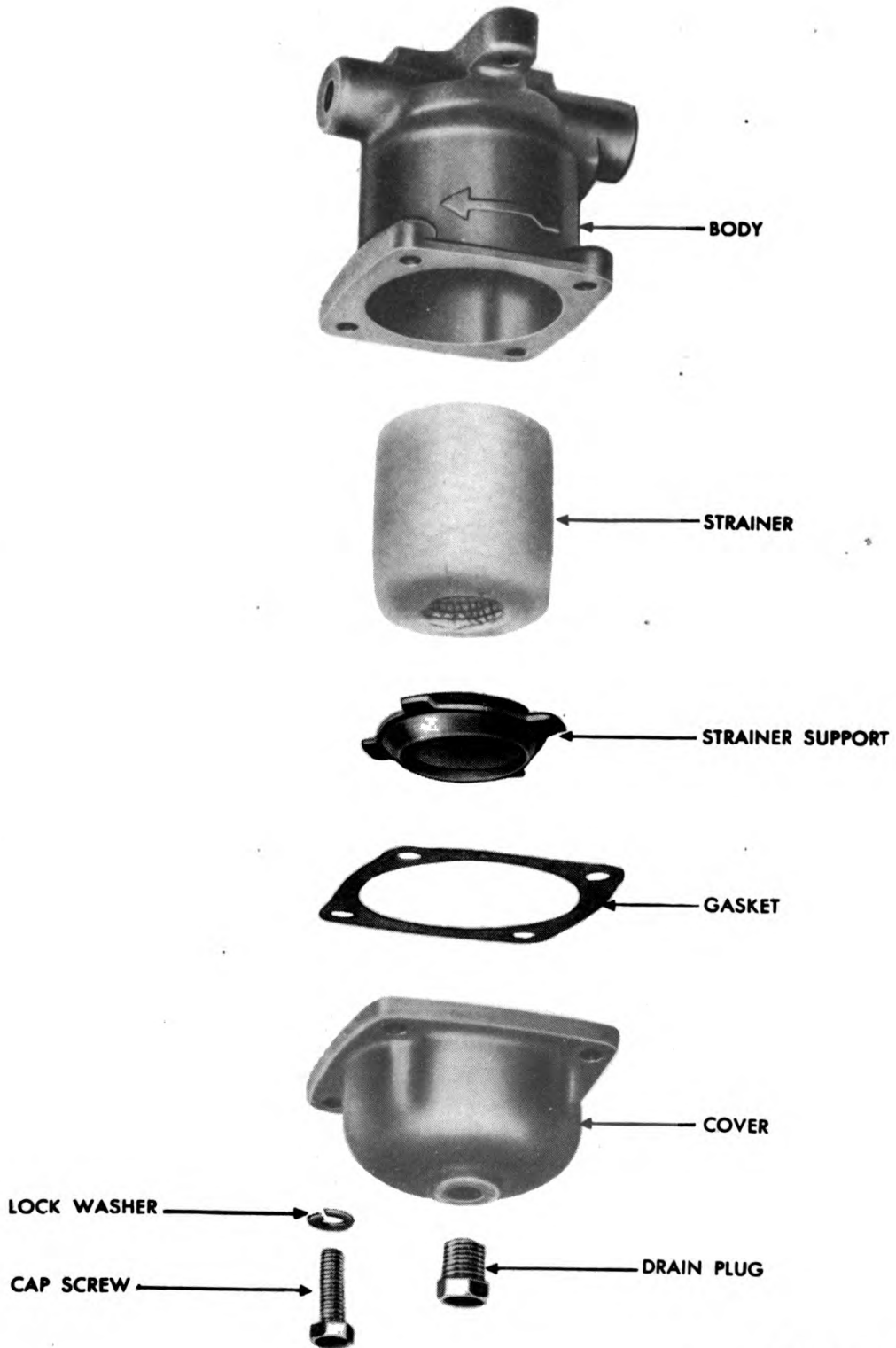
**Figure 71 — Air Filter — Sectionalized**

out of filter for about five seconds. Close cut-out cocks, and install drain plugs.

**c. Maintenance (fig. 72).** To clean filter, remove the four cap screws and lock washers fastening cover to body, and remove cover, gasket, strainer support, and strainer. Clean all metal parts with dry-cleaning solvent. If strainer is only dusty, clean it by brushing. If an oily or gummy deposit is present, replace the strainer. Discard old gasket. Position strainer in body. Place the new gasket and the strainer support on the cover. Install cover on body and secure with four cap screws and lock washers.

**d. Removal.** Disconnect air line at both sides of filter, and carefully pull tubing out of fittings. Remove the two mounting cap screws and lock washers, and remove filter.

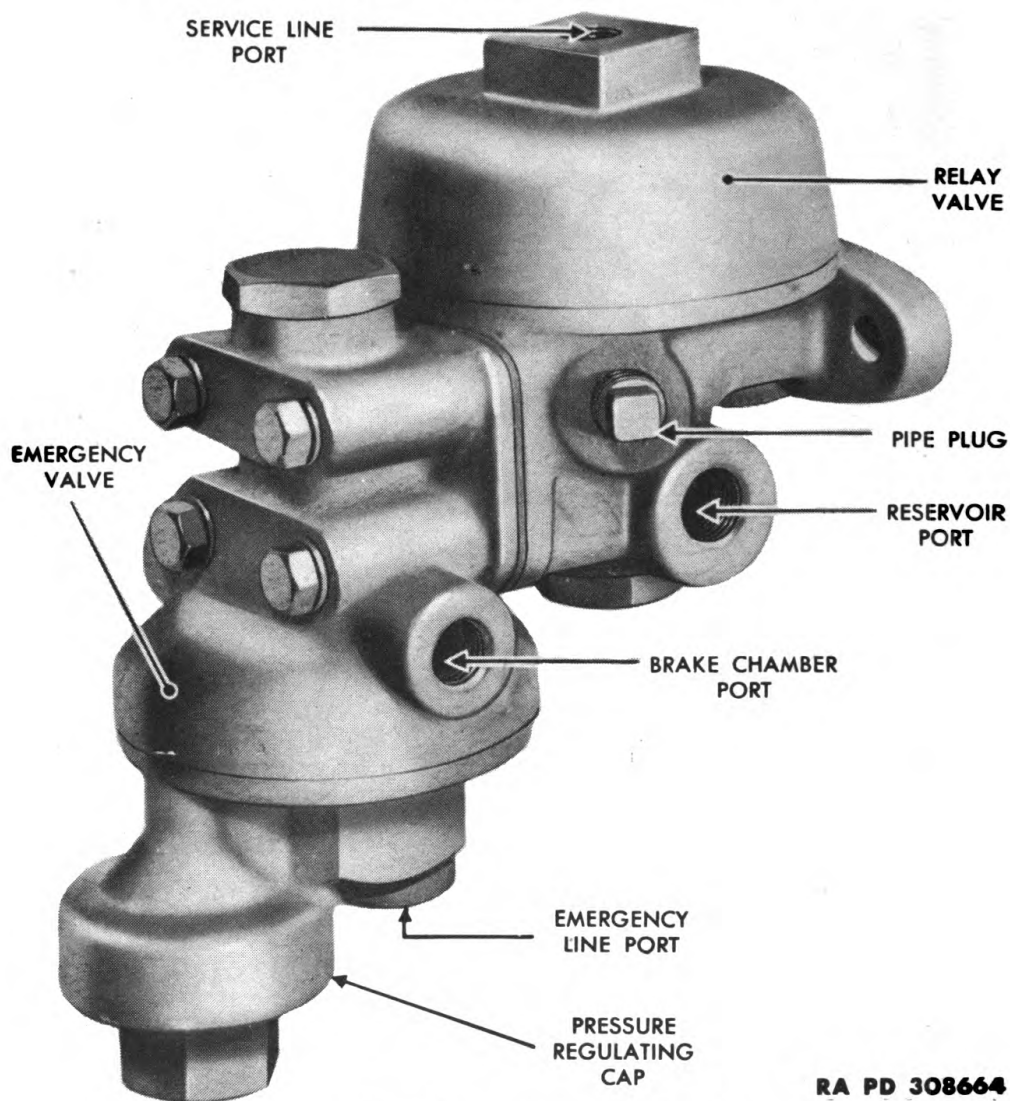
# AIR BRAKE SYSTEM



RA PD 308711

**Figure 72 — Air Filter — Disassembled**

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 308664

**Figure 73 — Emergency-relay Valve**

**e. Installation.** Position filter under bracket with arrow on filter body pointing toward rear of vehicle. Install mounting cap screws and lock washers. Install new sleeves on the tubing ends. Carefully insert tubing and sleeves into body and tighten connector nuts.

**f. Leakage Test.** With brakes applied, coat the outside of filter and connectors with soap suds and look for bubbles. No leakage is permissible. If walls of filter leak, replace the filter. If there is leakage past the gasket with the cap screws tight, replace the gasket.

**47. RELAY-EMERGENCY VALVE (figs. 18 and 73).**

**a. Description.** The relay-emergency valve consists of a relay valve to which has been added an emergency valve. The function of



## AIR BRAKE SYSTEM

the relay-emergency valve is to act as a relay station to control the brakes on a towed vehicle and to also automatically apply the brakes in the event the towed vehicle breaks away from the towing vehicle. As well as providing this safety feature, the relay-emergency valve speeds up the operation of the brakes both during application and release.

### b. Operating Tests.

(1) With the air brake system charged, apply the brakes and check to be sure all brakes apply properly.

(2) Release brakes and check to be sure air pressure is promptly passed from the exhaust port of the relay-emergency valve through the exhaust check valve.

(3) With the air brake system fully charged, close the cut-out cock in the emergency line on the tractor, and disconnect the emergency line from the trailer. See that trailer brakes apply automatically.

c. **Removal** (fig. 18). Close cut-out cocks on towing vehicle and open drain cock in trailer air reservoir to release all air from system. Disconnect all air lines at the valve. Pull tubing out of fittings just enough to allow the removal of the valve. Hold heads of mounting bolts, and remove nuts and internal-toothed lock washers. Support valve, and remove bolts. Remove valve mounting.

d. **Installation.** Position valve on front side of bulkhead and install mounting bolts through mounting flange and holes in bulkhead. Install internal-toothed lock washers and nuts loosely. Using new sleeves, insert the tubing ends into their respective connectors, and start connector nuts onto connector body. When all nuts are started onto connector threads, tighten mounting bolt nuts. Tighten connector nuts. Close reservoir drain cock.

e. **Leakage Test.** Charge system with air and listen for leaks. Coat all connections with soap suds and look for bubbles.

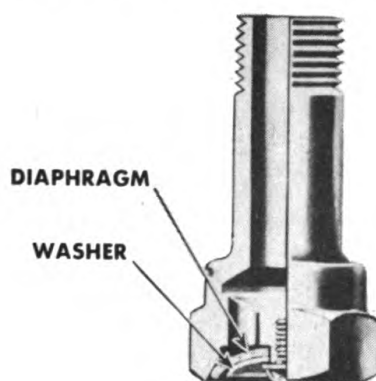
## 48. EXHAUST CHECK VALVE (fig. 74).

a. **General.** The exhaust check valve is mounted in the exhaust port of the relay-emergency valve to protect the relay-emergency valve against the entrance of dirt or water.

b. **Removal and Installation.** Use a wrench on the hexagonal lower portion of valve to remove or tighten the valve.

c. **Leakage Test.** Remove the exhaust check valve, and immerse the lower, or diaphragm end, in water. Check for leakage of water past the diaphragm. No leakage is permissible. If valve leaks, remove and examine diaphragm and diaphragm seat. If leakage is caused by the presence of dirt, clean the diaphragm and diaphragm

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 306069

Figure 74 — Exhaust Check Valve

seat. If leakage is caused by a defective diaphragm, replace the diaphragm. If diaphragm seat is damaged, replace the complete exhaust check valve.

49. AIR RESERVOIR (fig. 18).

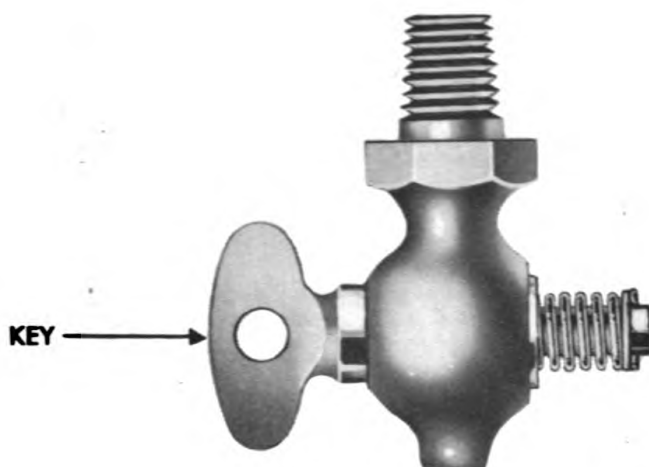
a. **Removal.** Disconnect air supply line at elbow connector on reservoir, and loosen connector nut at relay valve. Do not pull the line out of the connector. Remove nuts and washers from strap bracket clamping bolts, and remove bolts. Rotate tank in loosened brackets so that connector elbow on tank travels downward away from the supply line. This avoids bending the line and facilitates reassembly. When the connector and tubing are separated, move the tank rearward about 2 inches, and pull it straight out, away from brackets. **NOTE:** *If brackets are too tight to permit the removal of reservoir, remove the bolts fastening the lower bracket to the side of the body, and remove the lower bracket. To do this, hold the nuts behind the reservoir, and have a second man remove the bolts from inside the body.*

b. **Installation.** See that the supply line (fig. 18) is loose at the relay valve. Install a new sleeve on the tubing at the reservoir. Place the reservoir in the strap brackets and push forward as far as it will go. **NOTE:** *Pipe plug in front end of tank enters hole in bulkhead.* Install bracket bolts, nuts, and washers loosely. Rotate tank as needed to enter tubing and sleeve in the elbow connector. Continue to rotate tank until in approximately the position shown in figure 18. Install connector nut on reservoir elbow connector loosely. Tighten nuts on strap bracket bolts. Tighten connector nuts at reservoir and emergency-relay valve.

50. DRAIN COCK (figs. 18, 75 and 76).

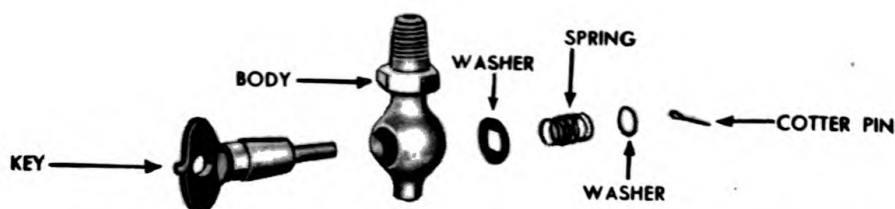
a. **Removal.** Use an open end wrench, and screw drain cock out of reservoir.

## AIR BRAKE SYSTEM



RA PD 308542

**Figure 75 — Reservoir Drain Cock**



RA PD 308606

**Figure 76 — Drain Cock, Disassembled**

**b. Disassembly.** Clamp hex of drain cock in a vise. Remove cotter pin, washer, spring, and spring seat washer. Remove key.

**c. Inspection.** Check spring tension. Inspect bearing surfaces of key and body for roughness or scoring. If either of these parts appear to be unserviceable, replace the drain cock.

**d. Assembly and Installation.** Install key in body. Install spring seat washer, spring, and second or retaining washer, and secure with a new cotter pin. Coat the threads with white lead or shellac, and screw drain cock into reservoir and tighten.

**e. Test.** Charge system with air, and coat threads and body area, at both ends of key, with soap suds. No leakage is permissible.

### 51. AIR CHAMBERS (figs. 67 and 77).

**a. Description.** An air, or power, chamber (fig. 77) mounted on a bracket welded to each end of both walking beams (fig. 67) converts the energy of compressed air into the force and motion necessary to apply the brakes.

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

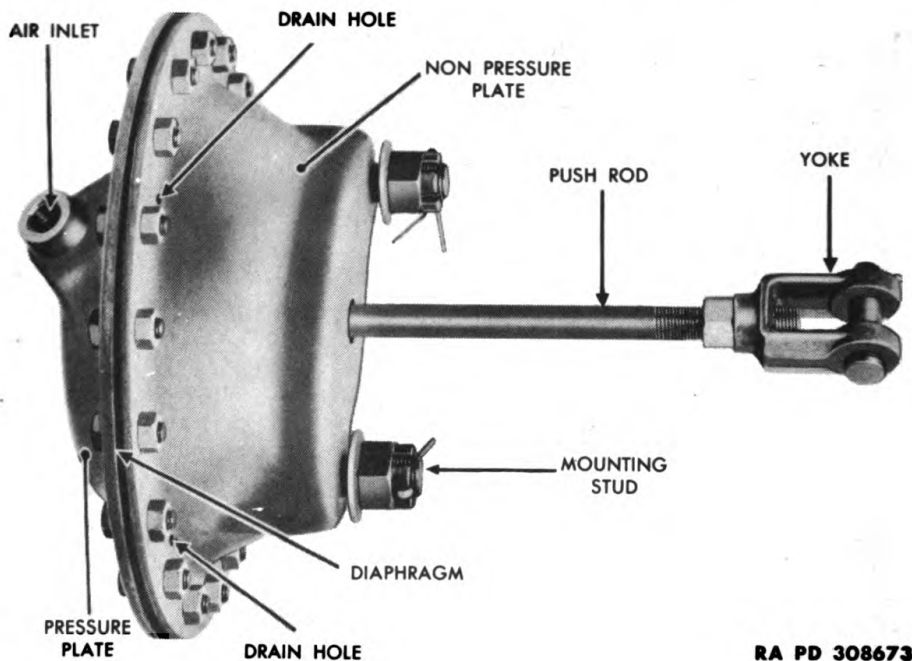


Figure 77 — Brake Air Chamber

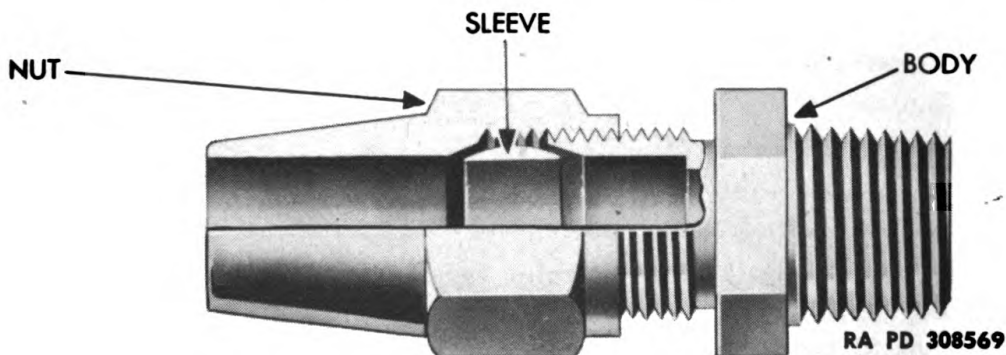
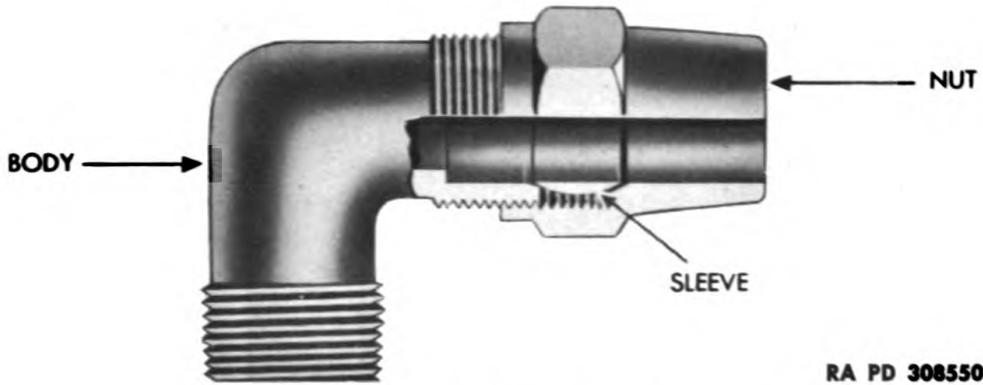


Figure 78 — Tubing Connector, Sectional View

b. **Removal** (fig. 67). Open reservoir drain cock to release air from system. Loosen tubing connector nut and carefully pull tubing out of connector. Remove cotter pin securing yoke pin, and remove yoke pin. Remove the nut and lock washer from the two mounting studs, and remove air chamber.

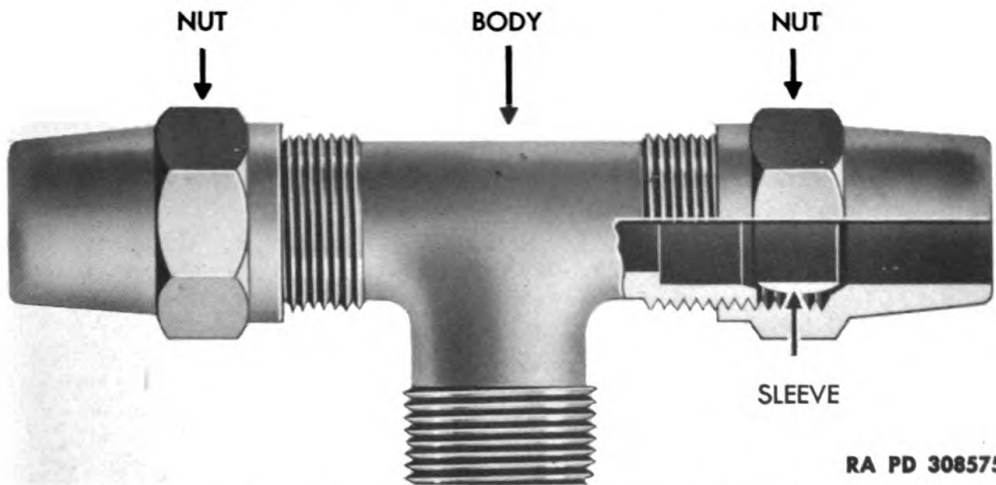
c. **Installation** (figs. 67 and 77). Install air chamber on support bracket with air inlet at bottom. Install lock washers, and nuts on studs, and tighten. Use a new sleeve and connect tubing. Rotate adjusting worm on slack adjuster to aline holes in push rod yoke with lower hole in slack adjuster arm. **NOTE:** *In connecting rear slack*

# AIR BRAKE SYSTEM



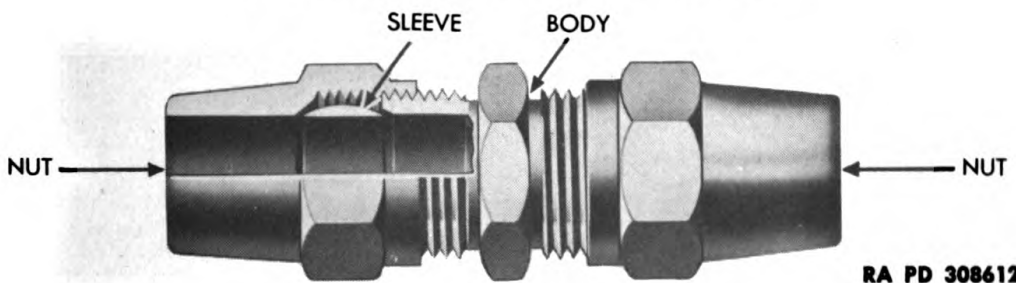
RA PD 308550

**Figure 79 — Tubing Elbow, Sectional View**



RA PD 308575

**Figure 80 — Tubing Tee, Sectional View**



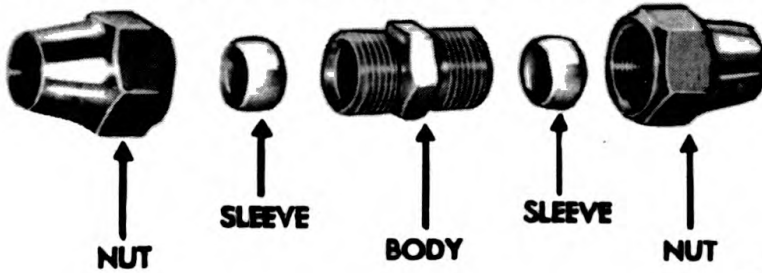
RA PD 308612

**Figure 81 — Tubing Union, Sectional View**

*adjusters the lower hole is used. If connecting to the front slack adjuster, the yoke is pinned to the top hole in the adjuster arm. Install yoke pin, and secure with a new cotter pin. Close reservoir drain cock.*

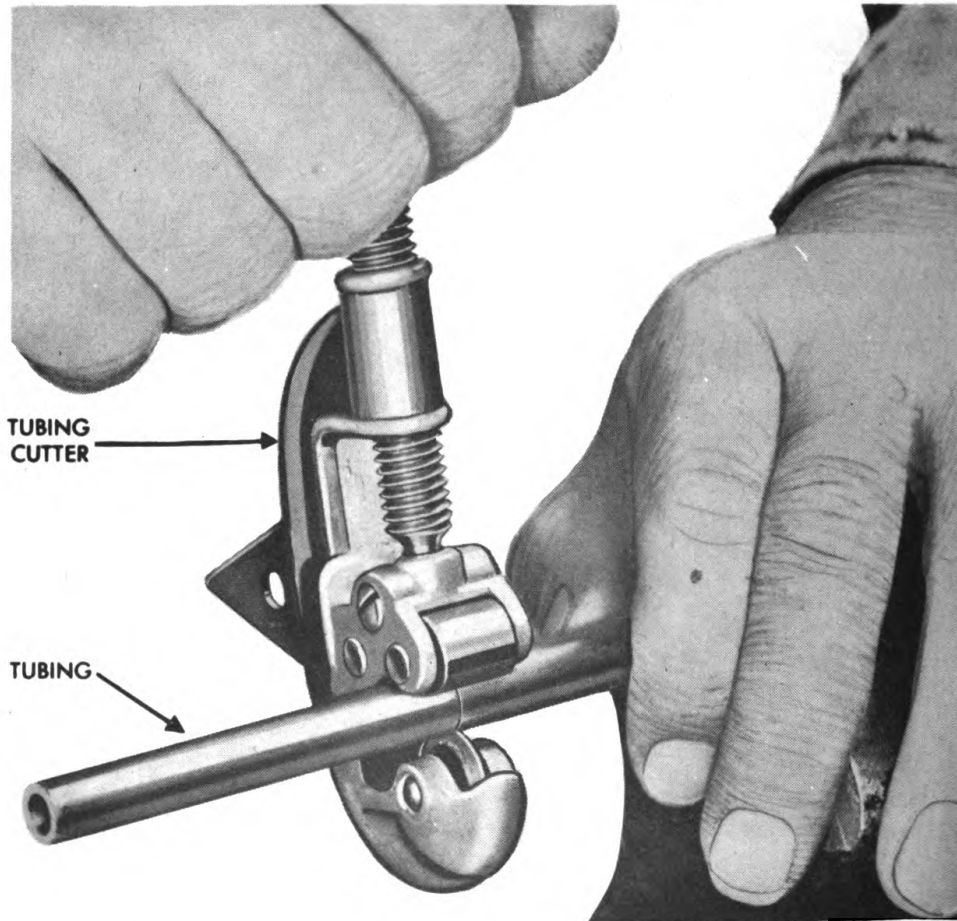
**d. Leakage Test.** Charge system with air and coat tubing connection with soap suds. Watch for bubbles. No leakage is permissible.

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 308611

Figure 82 — Tubing Union, Disassembled



RA PD 308678

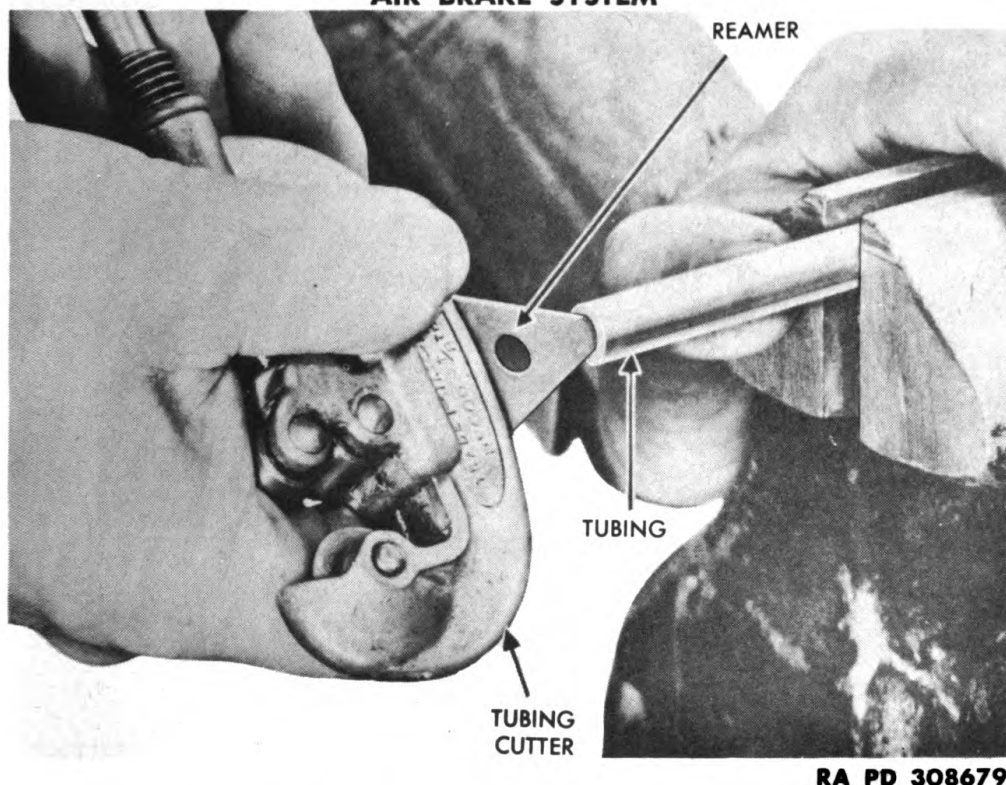
Figure 83 — Cutting Tubing Using Tool (41-C-2825)

## 52. TUBING AND FITTINGS.

a. **Description.** Loom protected copper tubing, with the necessary brass fittings, is used to carry the brake system air supply to all points on the vehicle except the walking beams. Here, because of the movement involved, flexible hoses are used. All tubing has an outside diameter of  $\frac{3}{8}$  inch except the supply line from the emergency-relay



## AIR BRAKE SYSTEM



RA PD 308679

**Figure 84 — Reaming Section of Tubing With Tool (41-C-2825)**

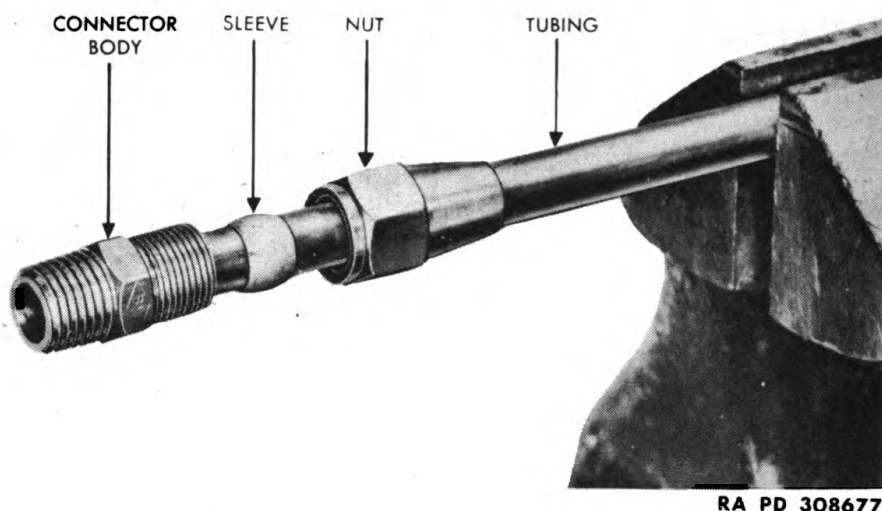
valve to the air reservoir. This line is  $\frac{1}{2}$ -inch outside diameter. All fittings are compression-type and are illustrated in figures 78, 79, 80, and 81. Figure 82 shows the repair unit, a tubing union, disassembled.

**b. Cleaning and Inspection.** Examine all tubing for dents and kinks. Clean tubing fittings with dry-cleaning solvent, and blow out tubing and fittings both ways with compressed air. Always replace a damaged fitting, and replace or repair damaged or kinked tubing.

**c. Preparation of Replacement Tubing.** Always measure old piece of tubing carefully and cut the new piece to exactly the required length. Use a hack saw or tubing cutter (fig. 83) and see that the end of the tubing is smooth and squarely cut. Ends of tubing must not be crimped or partially closed. Ream or file tubing ends if necessary (fig. 84). Blow out new section of tubing in both directions with compressed air to remove all cuttings or filings.

**d. Assembly.** Place nut and sleeve on tubing and put the end of the tubing in the recess in the tubing fitting body (fig. 85). Hold tubing at bottom of recess, and tighten nut to seal the joint against leakage. It is only necessary to tighten the nut until sufficient pressure is placed on the sleeve to prevent leakage. Always use a new sleeve, when replacing tubing lines. Tubing, fitting nuts, and bodies may be used again, provided they are in serviceable condition.

**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)**



**Figure 85 — Assembly of Tubing**

**53. CUT-OUT COCKS.**

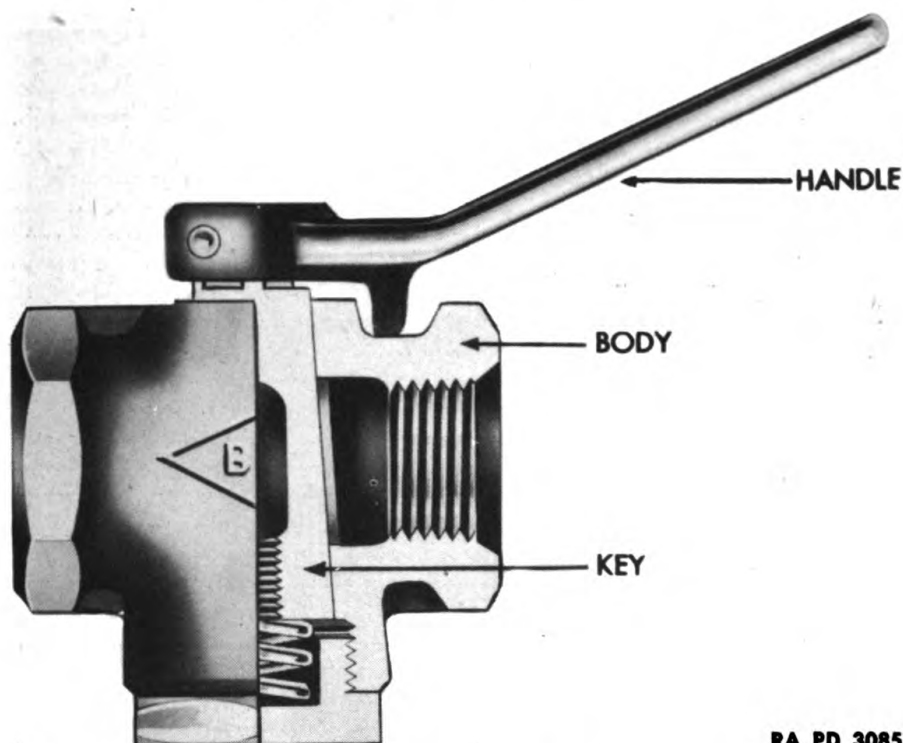
**a. Description.** Cut-out cocks (fig. 86) are used in the service line and emergency line on the trailer to provide a method of closing off these lines, when they are not being used in a tandem tow. The cut-out cock is open when the handle is at a 90 degree angle with the body of the cock. The cut-out cock is closed when the handle is parallel with the body of the cock. Stops are provided so that the handle cannot be turned beyond its normally open and closed positions. Always open and close cut-out cocks by hand. Never strike the handle with a hammer or any such heavy instrument, as it would damage the cock, and leakage might develop.

**b. Removal.** Open reservoir drain cock to release air from system. Disconnect air line at rear of cut-out cock, and pull tubing out of connector (fig. 17). Turn handle to "OFF" position. Use an open end wrench on hex at front of cut-out cock, and screw cock off bulkhead connector.

**c. Disassembly (fig. 87).** Drive out rivet pin attaching the handle to the key, and lift off handle. Remove cap nut covering the lower end of the key, and lift out spring. Remove key.

**d. Cleaning and Inspection of Parts.** Clean all parts in dry-cleaning solvent. Inspect the outside of the key, and inside bore of the body, for ridges and scoring. Leakage due to slight ridges and scoring is corrected by grinding the key to the body using (BWE grade 400) grinding compound or its equivalent. If leakage has been caused by excessive scoring, replace the complete cut-out cock. Do not attempt to fit or grind a new key to an old body or vice versa.

## AIR BRAKE SYSTEM



RA PD 308570

**Figure 86 — Cut-out Cock**

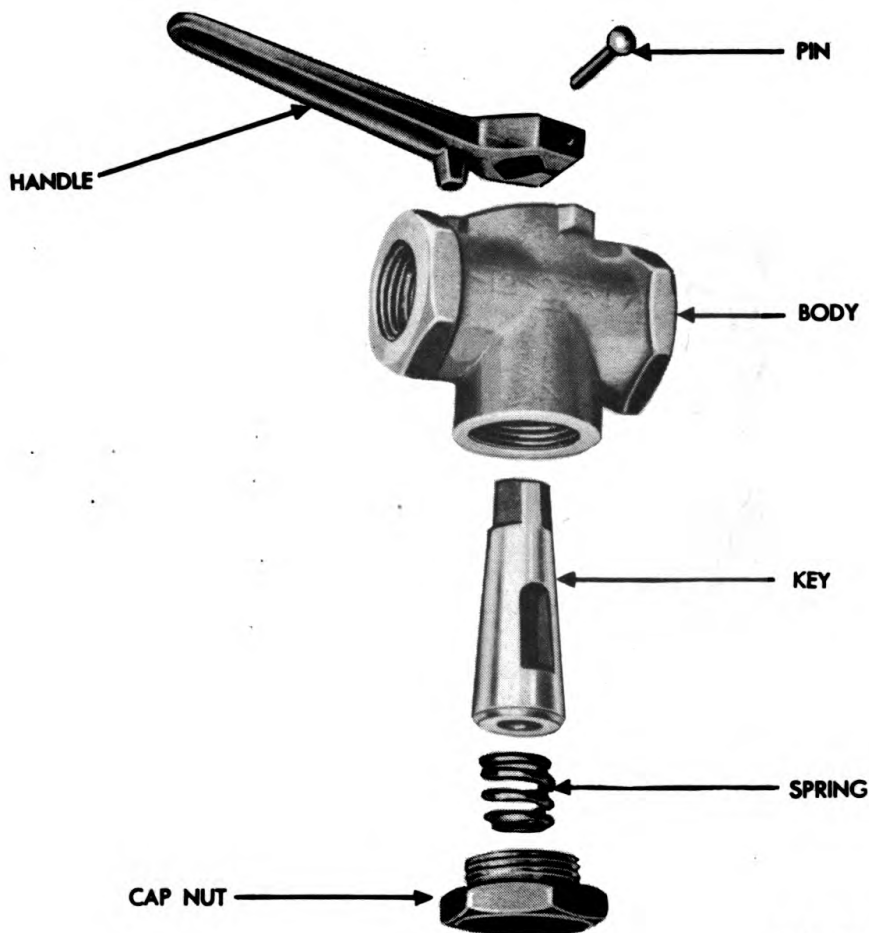
**e. Assembly.** Be sure all parts are thoroughly cleaned, apply a thin coating of grease with the fingers on the outside of the key and on the inside bore of the body. Place the key in position in the body. Install spring and cap nut putting a thin layer of grease under the head of the cap nut, where it contacts the body. Tighten cap nut securely. Place handle in position on key being sure the key is positioned so that with the handle installed, the projection at the bottom of the handle will properly engage the stops on the top of body in open, and closed, positions. Tap handle down on key so that rivet hole in key is in line with the rivet hole in the handle. Drive rivet into place and peen the end of it to make it secure.

**f. Installation.** Turn cut-out cock handle to "OFF" position (fig. 17). Coat threads of bulkhead connector with white lead or shellac, and screw cut-out cock onto the connector. Use an open end wrench on front hex to tighten, leaving the cock positioned so that the handle is at the top. Put a new sleeve on the tubing end and connect tubing to connector in rearward end of cut-out cock.

## 54. AIR HOSE AND CONNECTOR.

**a. Description (fig. 88).** Hose and hose fittings provide a means of making flexible air connections between the points on the trailer,

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 308540

**Figure 87 — Cut-out Cock Assembly Sequence**

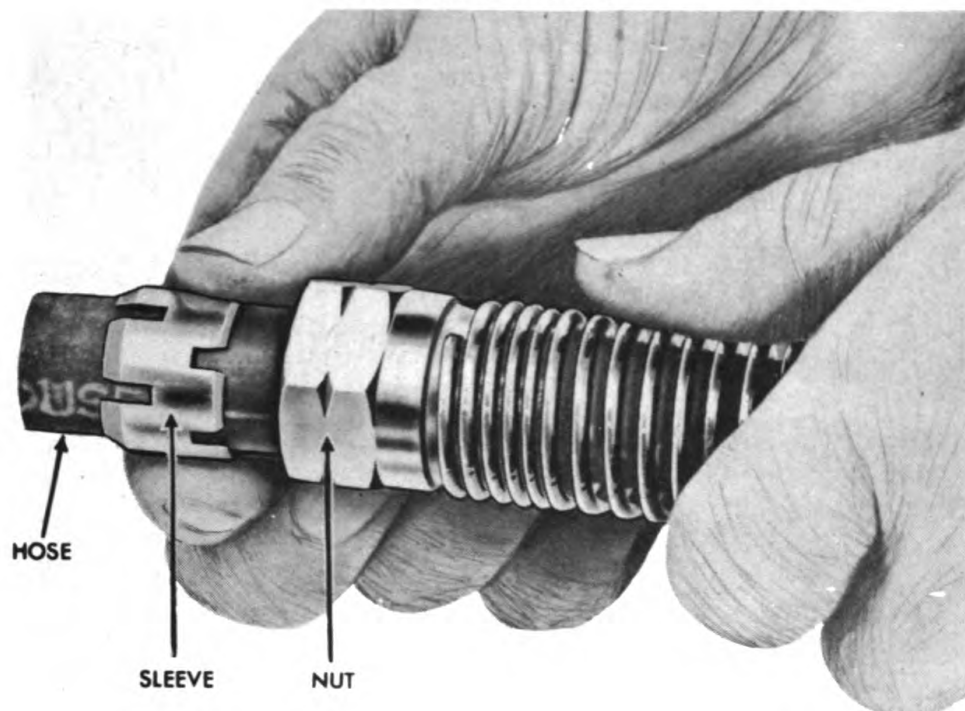


RA PD 308607

**Figure 88 — Hose Assembly Disassembled**

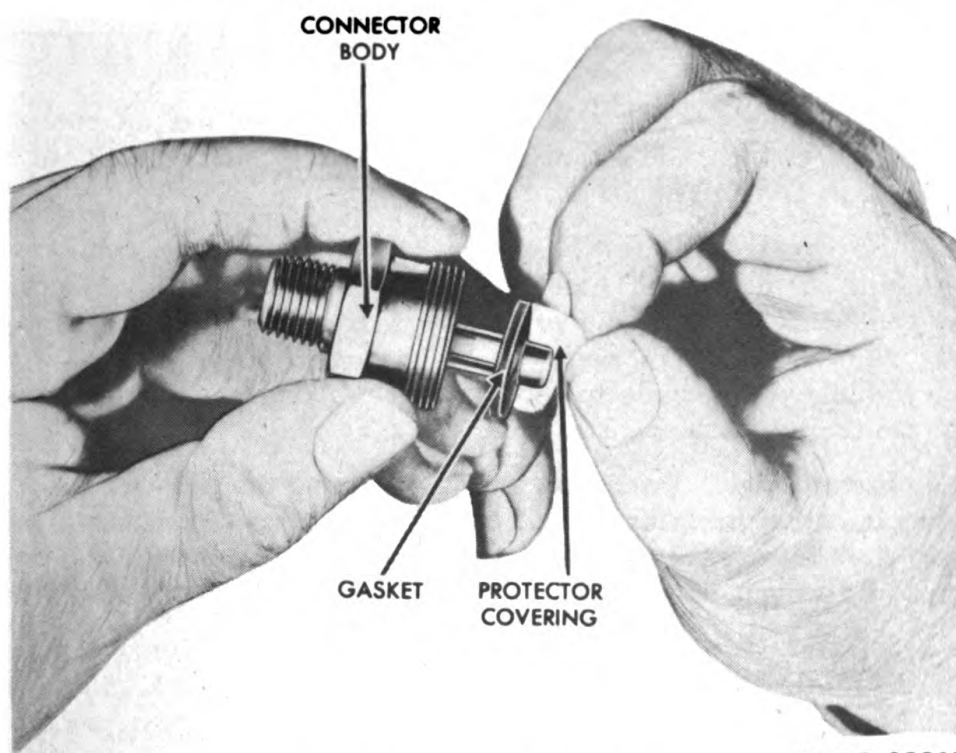
which normally change their position in relation to each other, and between the trailer and towing or towed vehicle. Hose assemblies used to connect the air brake system of the trailer to the air brake system of a towing, or towed, vehicle are fitted with hose couplings (fig. 93). All hose assemblies include detachable-type hose fittings

# AIR BRAKE SYSTEM



RA PD 308683

**Figure 89 — Positioning Connector Nut and Sleeve On Hose**

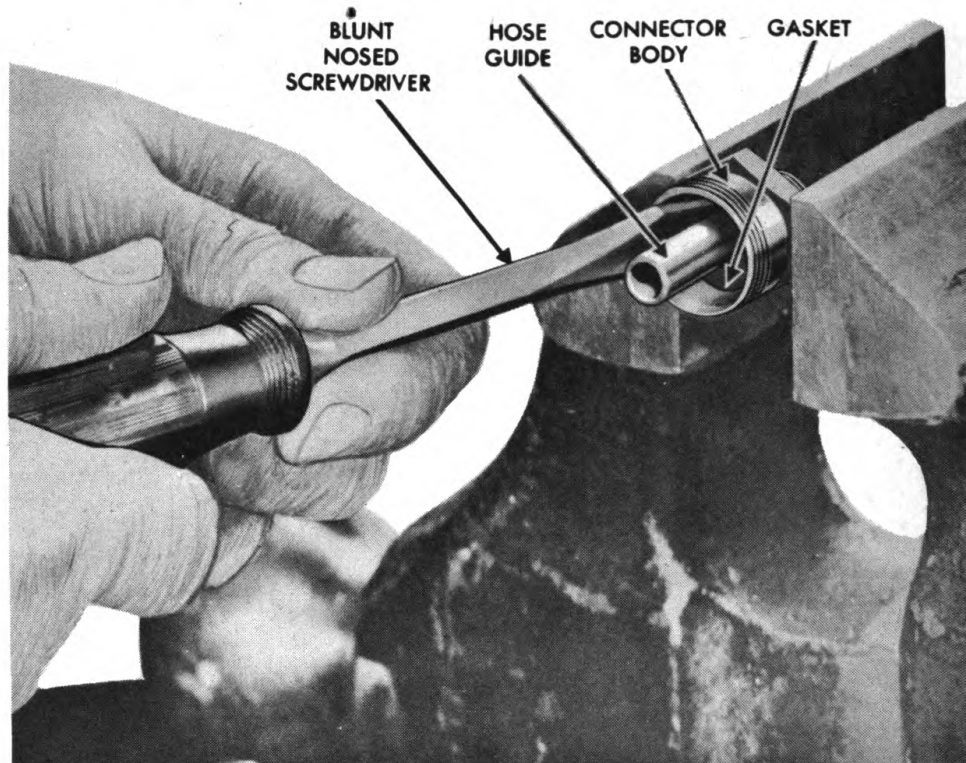


RA PD 308682

**Figure 90 — Removing Gasket Covering**



TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 308681

**Figure 91 — Seating Gasket In Connector Body**

with spring guards. The special rubber hose used has an outside diameter of  $\frac{3}{4}$  inch, and an inside diameter of  $\frac{3}{8}$  inch. The hose is identified as BWE BW-101-M.

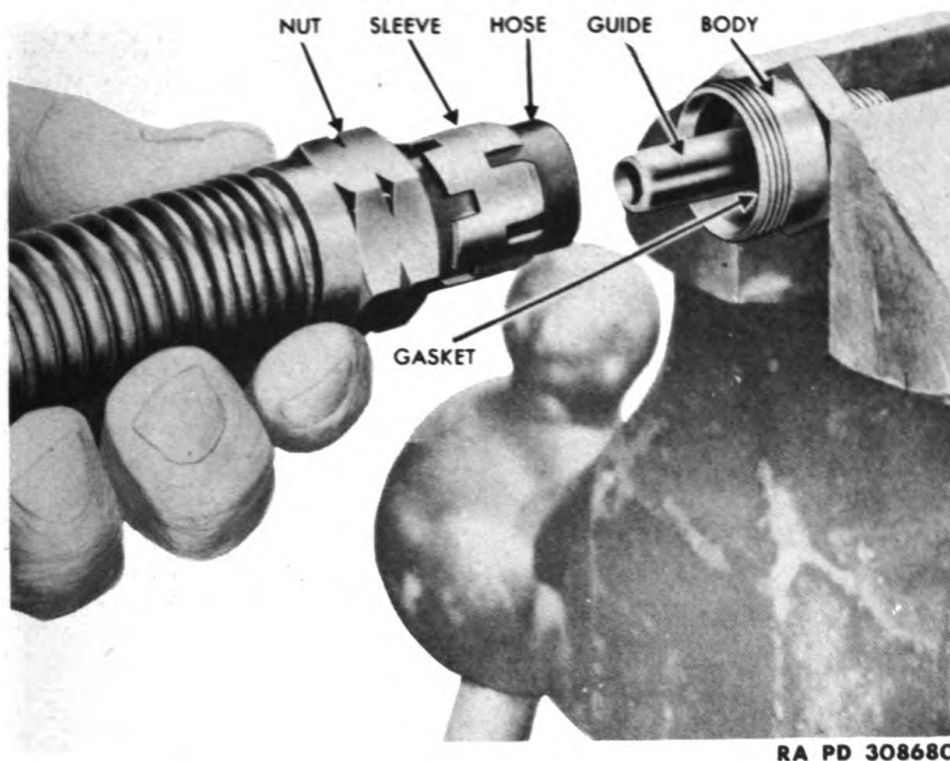
**b. Removal.** Unscrew hose connector nut from hose connector at walking beam, and pull hose up and off of connector body. Screw hose connector and hose out of connector bracketed to trailer body post. **NOTE:** *This is a permanently connected fitting.* Unless it is damaged, leave the connector body in the walking beam fitting, and tape the threads to prevent damage.

**c. Installation.** Install the hose end, having the permanent connector, into the fitting bracketed to the body post. Push the other end of the hose over the hose guide in connector body on the walking beam. Screw nut onto body.

**d. Disassembly of Jumper Hoses (fig. 88).** Remove hose coupling if attached. Remove nut from body of fitting and pull hose out of body. Do not remove sleeve from hose. If a new piece of hose is to be installed, use a new sleeve. Do not remove hose guide, from fitting body.



## AIR BRAKE SYSTEM

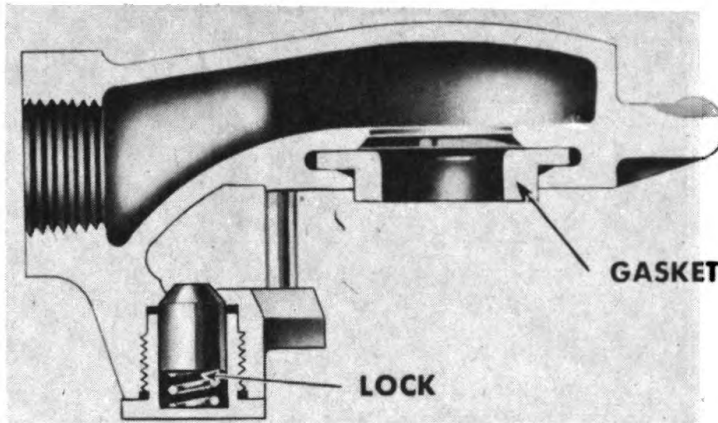


**Figure 92 — Installing Hose In Connector Body**

**e. Cleaning and Inspection of Parts.** Clean all metal parts in dry-cleaning solvent. Inspect hose for abrasions, swelling, or other damage. If hose is damaged, replace with a new piece, and discard sleeve and gasket. Springs, nuts, and bodies may be used again unless they are damaged.

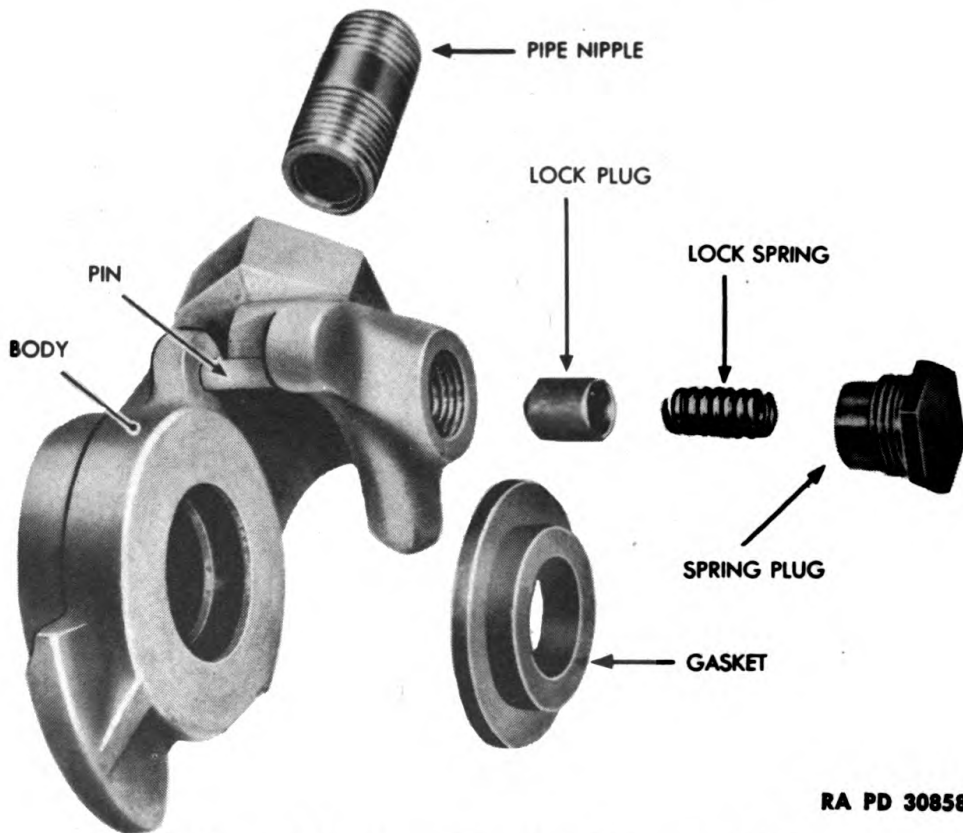
**f. Assembly.** Cut hose to desired length being sure the cut is made at right angles to the outside wall of the hose and that the end of the hose is smooth. Blow out the hose with an air line to remove all cuttings. Position nut and sleeve on hose (fig. 89) being sure the barbs on the inside of the sleeve point toward the end of the hose. Place a new gasket over the end of the guide in the fitting body so the side with the removable protector covering (fig. 90) will be next to the hose. Remove the protector covering from the gasket. Use a blunt screwdriver and push gasket on into connector body making certain that gasket is on its seat (fig. 91). Put the end of the hose in the fitting body (fig. 92), making sure the end of the hose and the gasket are against the bottom of the recess in the fitting body. Move the sleeve, if necessary, until it is against the edge of the fitting body. Then tighten the fitting nut. It is only necessary to tighten the nut sufficiently to insure a good airtight joint.

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 306071

**Figure 93 — Sectional View of Hose Coupling**



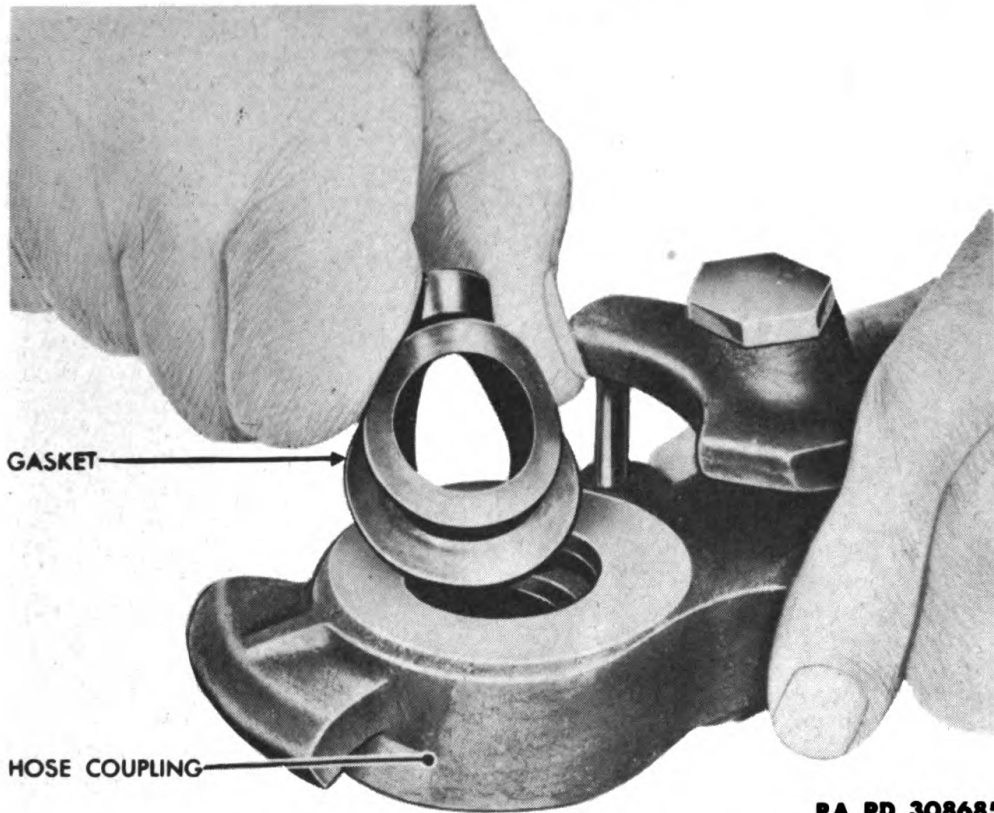
RA PD 308584

**Figure 94 — Hose Coupling Disassembled**

**55. AIR HOSE COUPLINGS.**

a. **Description.** Hose couplings (fig. 93) provide an easy and convenient method of connecting, and disconnecting, air lines between vehicles. The design of the hose coupling is such that when two of them are coupled together, pressure is put on two rubber gaskets

## AIR BRAKE SYSTEM



RA PD 308685

**Figure 95 — Starting Coupling Gasket Into Groove**

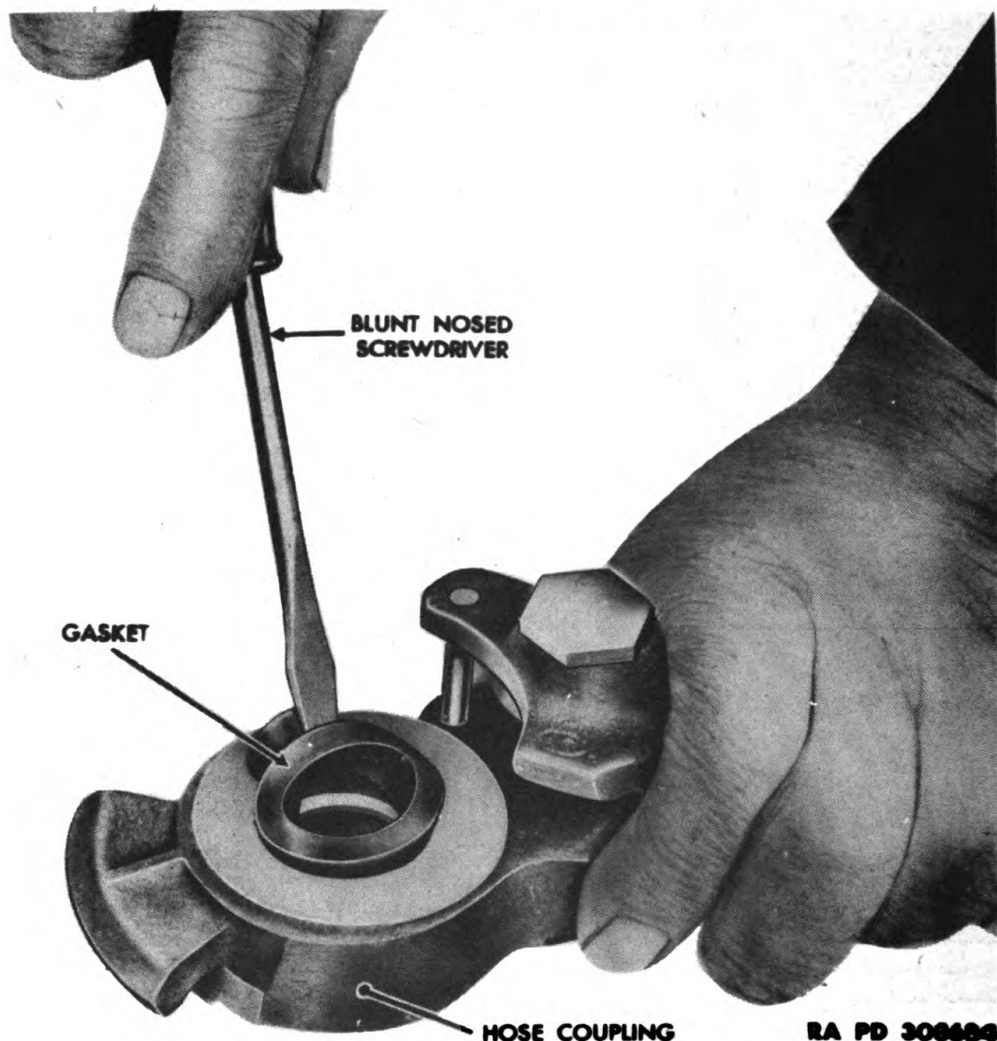
making an airtight seal and at the same time providing a joint which can be easily connected, or disconnected, by hand. All couplings are fitted with friction locks to maintain them in their locked position. All couplings are interchangeable.

**b. Removal and Disassembly (fig. 94).** Screw the coupling off the hose connector body, or off the bulkhead connector if attached to the trailer body. Remove the lock spring plug, lock spring and lock spring plunger.

**c. Cleaning and Inspection.** Discard old gasket and clean all other parts in dry-cleaning solvent. Examine friction lock spring and lock spring plunger for wear or damage, and replace if necessary. When cleaning the hose coupling body, give particular attention to the groove into which the flange of the hose coupling gasket fits. This groove must be scraped thoroughly clean, otherwise the new gasket will not go into place properly.

**d. Assembly.** To install a new gasket, partially collapse the coupling with the fingers and enter one side of the gasket flange in the groove (fig. 95). Then use a blunt nose screwdriver or some similar instrument to complete pushing the gasket in place (fig. 96).

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



**Figure 96 — Seating Coupling Gasket**

When properly installed, the exposed face of the gasket will be flat and not twisted or bulged at any point. With a new gasket installed, the assembly of the hose coupling is completed by installing the friction lock parts.

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Section XIV

**WALKING BEAM AND STUB AXLE**

**56. DESCRIPTION AND DATA.**

a. **Description** (fig. 97). The walking beam is a welded frame whose centrally located hub oscillates on the center cross, or main, axle. The inner surface of a casting, welded at each end of the walk-

# WALKING BEAM AND STUB AXLE

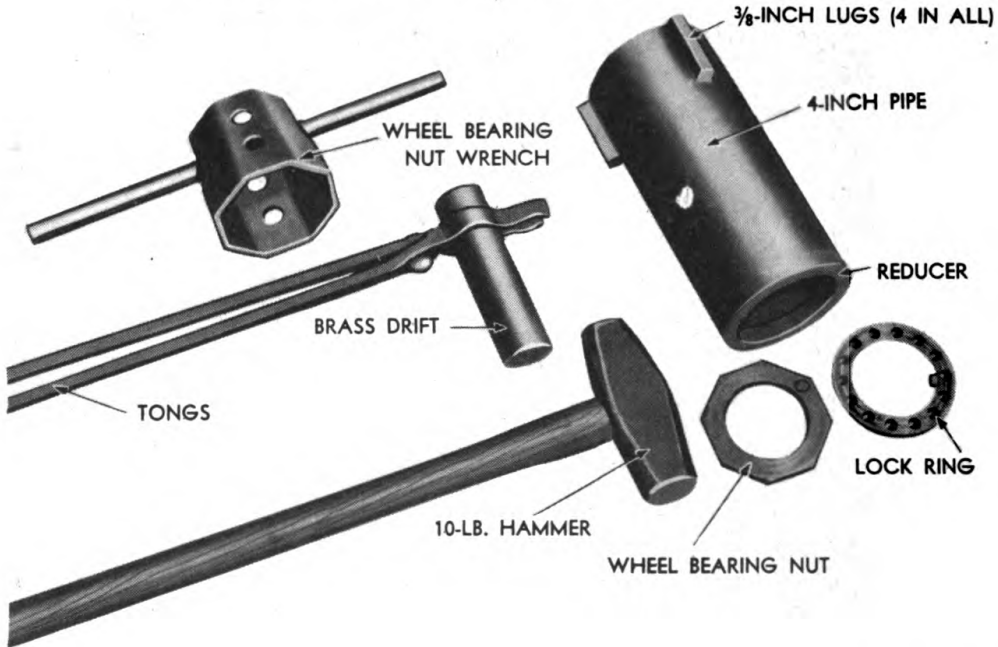


RA PD 335253

**Figure 97 — Walking Beam Hub Cap Removed**



**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)**



RA PD 335000

**Figure 98 — Tools Used In Stub Axle Removal**

ing beam, is machined on a slight taper to mount a stub axle which carries the wheel hub and drum assembly. A flange, machined on each of these end castings, supports the brake dust shield. A bracket, welded at the front end of the walking beam, supports a brake air chamber and the camshaft outboard bearing. A similar bracket at the rear of the walking beam, mounts the air chamber and camshaft bearing for the rear wheel and also supports the parking brake lever assembly.

**b. Data.**

**(1) WALKING BEAM.**

Stock number, L. H. .... G216-7014916

Stock number, R.H. .... G216-7014917

**(2) STUB AXLE.**

Stock Number .... 9120-44A-250

**57. STUB AXLE REMOVAL.**

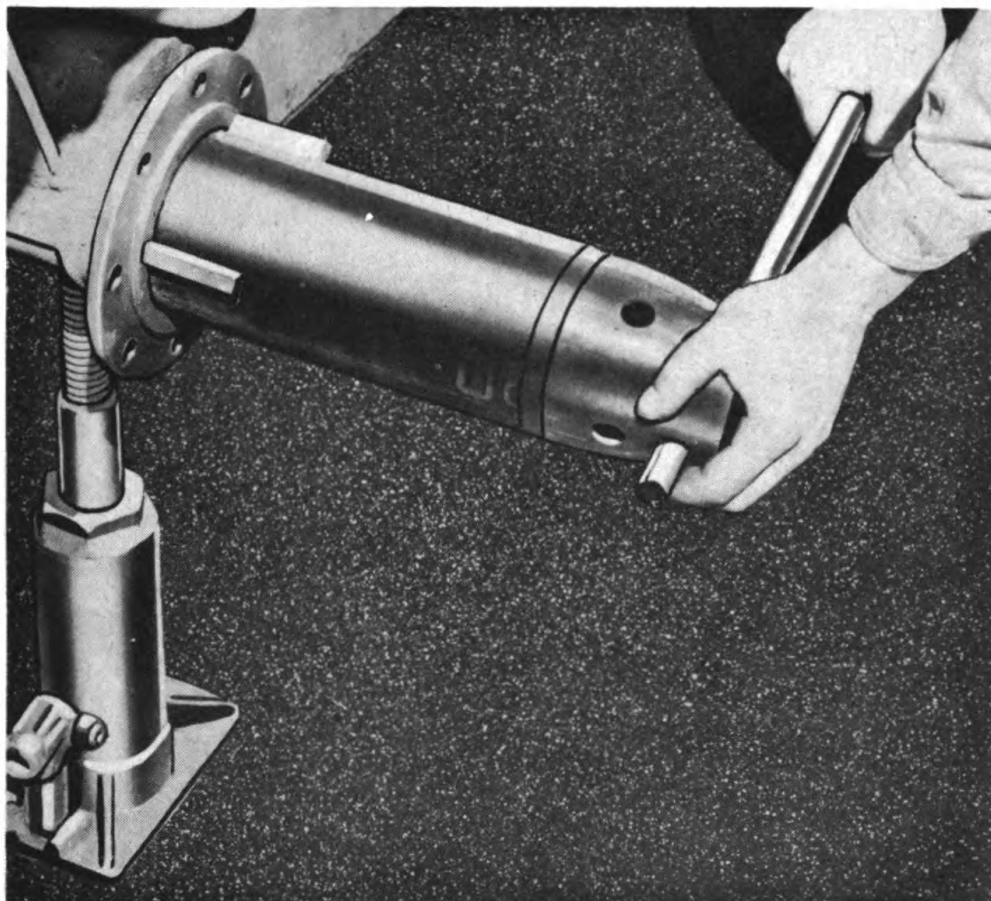
**a. Remove Wheel Assembly (par. 36 a (1) ).**

**b. Remove Hub and Drum Assembly (par. 36 a (2) and b (1) ).**

**c. Remove Stub Axle.** Remove cotter pin, nut, and washer securing stub axle (fig. 62). Screw nut onto threads until outside of nut



## WALKING BEAM AND STUB AXLE



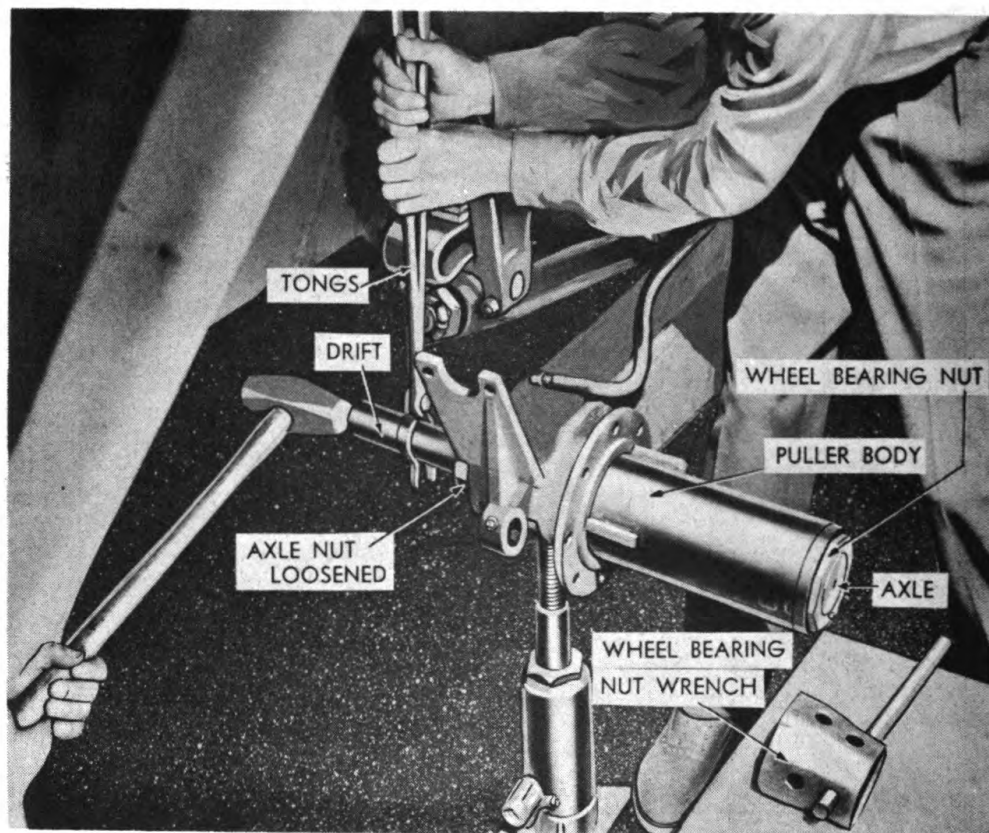
RA PD 334912

**Figure 99 — Using Puller To Apply Tension On Axle**

is flush with axle end. Use a 5-pound hammer and strike the end of the axle a few sharp blows until axle is loosened in taper. Remove nut and remove axle. **NOTE:** *If the above procedure did not loosen axle, continue as described in subparagraph d below.*

d. **Install Axle Puller** (figs. 98 and 99). The tools illustrated in figure 98 are all that are required to remove a "frozen" axle. **NOTE:** *If a puller is not available, one can be made up by welding four  $\frac{3}{8}$ -inch or  $\frac{1}{2}$ -inch lugs on one end of a 4-inch pipe, 8 inches long. On the other end of the pipe, weld a 3-inch reducer or weld lugs to the inside of the pipe flush with the outer end. A similar improvised puller is shown in figure 98. Install puller with lugs against dust shield flange (fig. 99). Install wheel bearing adjusting nut, locking washer, and adjusting nut on axle threads and screw up against puller body. Use wheel bearing nut wrench, and tighten nut. With axle retaining nut loosened, use a brass drift against the axle end, and drive with a 10-pound hammer (fig. 100). Remove retaining nut. Remove puller and axle.*

## TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 334911

**Figure 100 — Loosening Stub Axle****58. STUB AXLE INSTALLATION.**

a. Slide stub axle into taper with cotter pin hole vertical (fig. 62) and key way at the side as in figure 60. Install washer and axle-nut, and tighten. Install cotter pin and lock.

**59. WALKING BEAM AND WHEELS ASSEMBLY REMOVAL.**

a. **Support Vehicle.** Disconnect flexible air hose at tee fitting on walking beam, and pull hose off connector body guide. Wrap connector body with tape to protect threads. Jack up center cross axle near walking beam until tires are an inch above the ground. Place blocks under axle and remove jack. Slide a lightly greased board under each tire, square with, and extending about two feet outside of the tire.

b. **Remove Walking Beam.** Remove four walking beam hub cap bolts, nuts, and washers, and remove hub cap. Remove axle nut cotter pin, and remove axle nut and washer. Place a man at walking beam hub to guide walking beam, and a man at each wheel to push on assembly and to hold the assembly upright, when not supported

## WALKING BEAM AND STUB AXLE

by the axle. Have a fourth man use a bar from behind the walking beam. Slide the assembly off the axle and out to the end of the greased boards, and support the assembly upright, by blocking under inner end of walking beam hub.

c. **Remove Second Walking Beam.** Remove the second walking beam as described in a. and b. above. *NOTE: This removal procedure is used only when the center cross axle is to be replaced. When replacing an unserviceable walking beam, follow the instructions in paragraph 61.*

## 60. WALKING BEAM AND WHEELS ASSEMBLY INSTALLATION.

a. **Clean and Lubricate.** Clean axle spindle with dry-cleaning solvent. When dry, oil bearing surfaces lightly. Remove all old grease from walking beam hub, and wash out with dry-cleaning solvent. When dry, coat bearing surfaces with engine oil.

b. **Installation.** With personnel positioned as in paragraph 59, remove blocking, and slide the assembly onto the axle. Be sure that the lip on the inner end of the hub slides over the flanged portion of the inner bearing surface on the axle (fig. 103). Jack up axle so that both tires are 2 inches above the floor or ground. Install axle washer and nut, and tighten until walking beam is just free on axle. Use a bar from both sides of walking beam, and check end play on axle. No end play is permissible. Install cotter pin. Install hub cap. Connect air hose at walking beam. Remove jack and blocking. Lubricate as recommended in paragraph 18.

## 61. WALKING BEAM REMOVAL.

a. **Preparation for Disassembly.** Jack up center cross axle close to walking beam so that both tires carry just enough weight to prevent their rotation. Disconnect air hose at walking beam fitting.

b. **Remove Wheels.** Refer to paragraph 36 a (1).

c. **Remove Hub and Drum Assemblies.** Refer to paragraph 36 a (2) and b (1).

d. **Remove Parking Brake Lever.** Refer to paragraph 43 b.

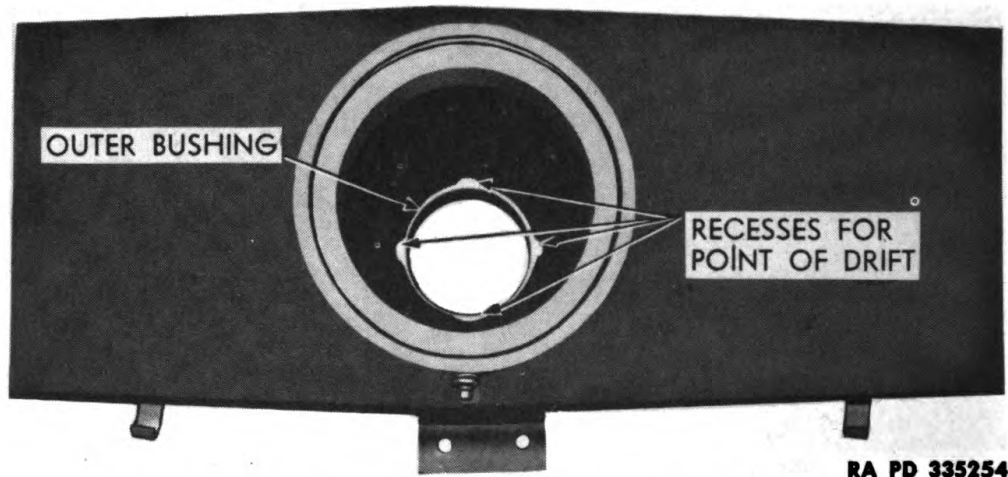
e. **Remove Slack Adjusters.** Refer to paragraph 42 a (2).

f. **Remove Brake Air Chambers.** Refer to paragraph 51 b.

g. **Remove Dust Shields (par. 42 e (1)).** *NOTE: In this case, remove the dust shield with the camshaft and camshaft bracket in place as shown in figure 68.*

h. **Remove Walking Beam.** Remove four hub cap bolts, nuts and washers and remove hub cap. Remove axle nut cotter pin and

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**Figure 101 – Walking Beam Bushing Removal**

remove axle nut and washer (fig. 97). With a man at each end of the walking beam, lift the beam straight out, off the axle spindle.

**62. REMOVAL OF WALKING BEAM BUSHINGS.**

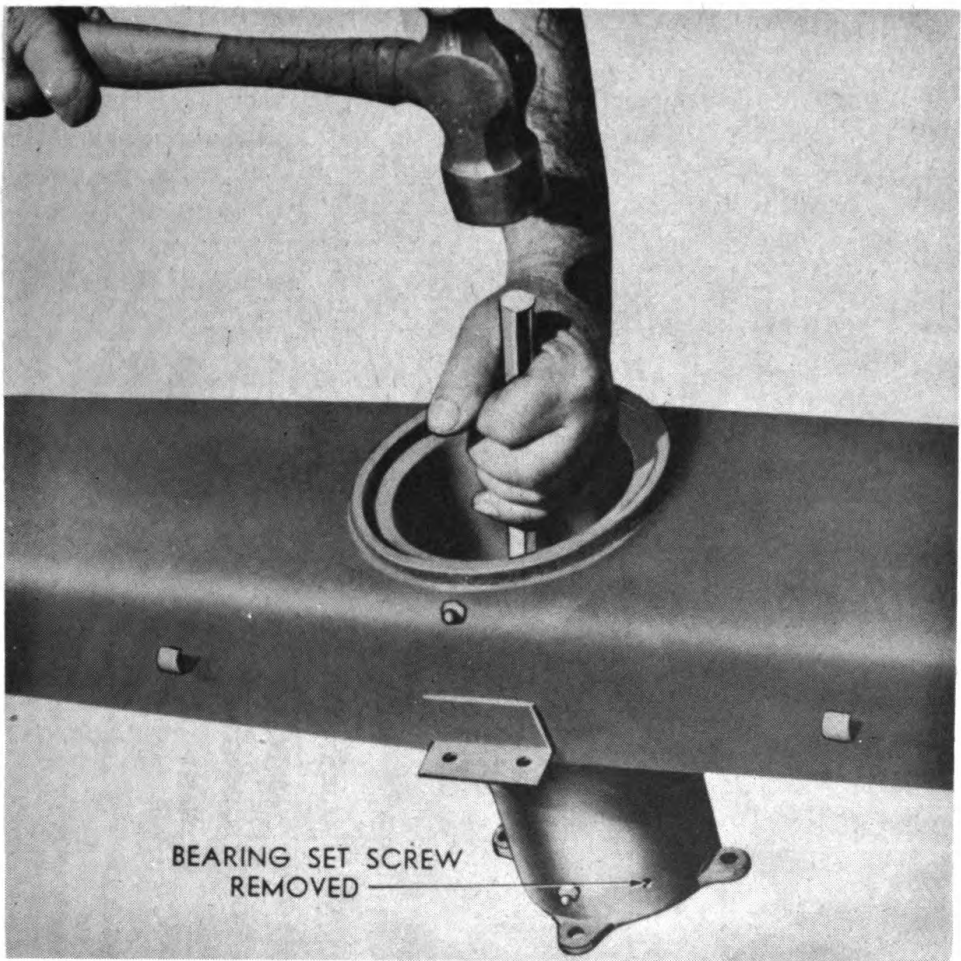
- a. **Remove Walking Beam.** Refer to paragraph 61.
- b. **Remove Outer Bushing.** Remove grease from bushings and center of hub. Support walking beam ends so that inner or larger bushing is uppermost as in figure 101. Remove outer bushing set screw (fig. 102), and internal-toothed lock washer. Using a long drift, through the larger bushing, drive the outer bushing out of hub bore. To lessen the danger of wedging, drive alternately at each of the four recessed points. Remove bushing.
- c. **Remove Inner Bushing.** Turn walking beam so that outer end of hub is uppermost. Remove inner bushing as described in subparagraph b above, except for removal of the set screw, which is not used in the larger bushing.

**63. INSTALLATION OF WALKING BEAM BUSHINGS.**

- a. **Clean Hub and Bores.** Remove all old grease from center of hub and from bushing bores. Wash interior with dry-cleaning solvent, and allow to dry.
- b. **Install Inner Bushing.** Support walking beam as in figure 101. Aline inner, or larger, bushing with bushing bore, and tap lightly all the way around edge of bushing to be sure it starts into the hole squarely. Use the old bushing against the edge of the new bushing and, driving alternately on the opposite sides, drive new bushing into hub until the outer, or upper, edge of the bushing is flush with the edge of the hub lip. Use a soft iron drift and drive bushing onto



## WALKING BEAM AND STUB AXLE



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**Figure 102 — Driving Outer Bushing Out of Bore**

its seat. Tap soundly all the way around the bushing edge to be certain that bushing is seated at all points.

c. **Install Outer Bushing.** Turn walking beam so that outer bore is uppermost. Carefully aline outer bushing so that set screw hole in bushing is near outer, or upper, edge of bushing and in line with the tapped set screw hole in the walking beam hub (fig. 102). Start bushing into hub and drive onto its seat as in subparagraph b above. Install set screw and internal-toothed lock washer and tighten.

## 64. WALKING BEAM INSTALLATION.

a. **Cleaning and Inspection.** Thoroughly clean all grease and dirt from center cross axle spindle and lubricant grooves. Wash with dry-cleaning solvent, and allow to dry. See that walking beam bush-

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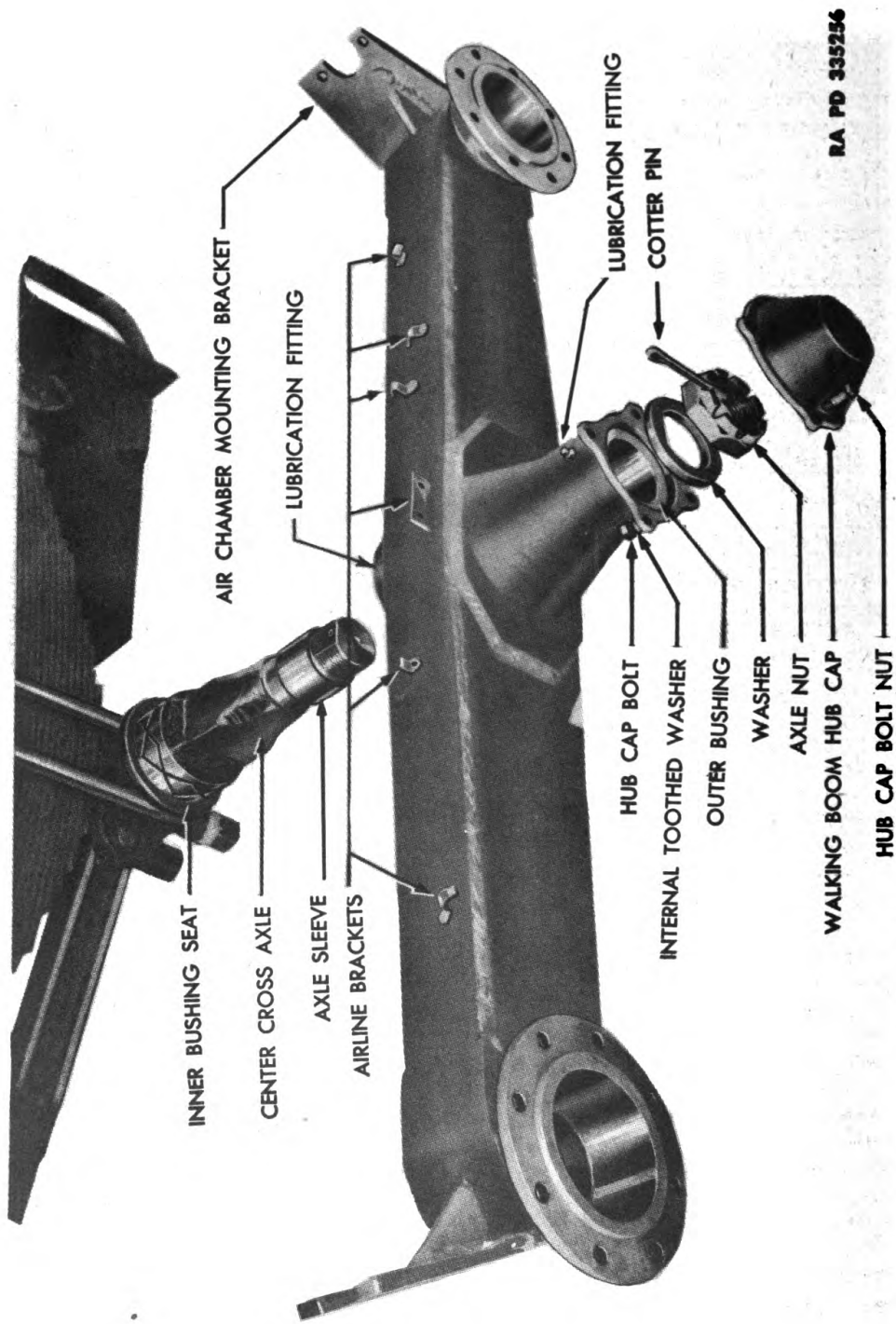


Figure 103 — Walking Beam Assembly Sequence



## CENTER CROSS AXLE

ings are free of dirt or other foreign matter. Coat bearing surfaces, on axle spindle and in walking beam hub, lightly with oil.

b. **Install Walking Beam.** Two men lift walking beam onto axle spindle making certain that inner lip of hub goes over flange at back of spindle inner bearing surface. Install axle washer and nut, and tighten sufficiently to eliminate all end play and still allow the walking beam to rotate on spindle. Install and lock the cotter pin (fig. 97). Install hub cap.

c. **Install Brake Dust Shields.** Refer to paragraph 42 e (2).

d. **Install Brake Air Chambers.** Refer to paragraph 51 c.

e. **Install Slack Adjusters.** Refer to paragraph 42 a (3).

f. **Install Parking Brake Lever.** Refer to paragraph 43 c.

g. **Install Hub and Drum Assemblies.** Refer to paragraph 36 d (1).

h. **Install Wheels.** Refer to paragraph 36 d (4).

i. **Connect Air Hose and Test.** Connect air hose at walking beam fitting and tighten. If possible, charge system with air, and coat all air connections which were disturbed with soapy water. Look for bubbles at all fittings, and tighten until leaks disappear. Lower center cross axle, and remove jack. Check wheel nuts for tightness. Lubricate (par. 18).

## 65. WALKING BEAM ADJUSTMENT.

a. Adjust walking beam as described in paragraph 60 b.

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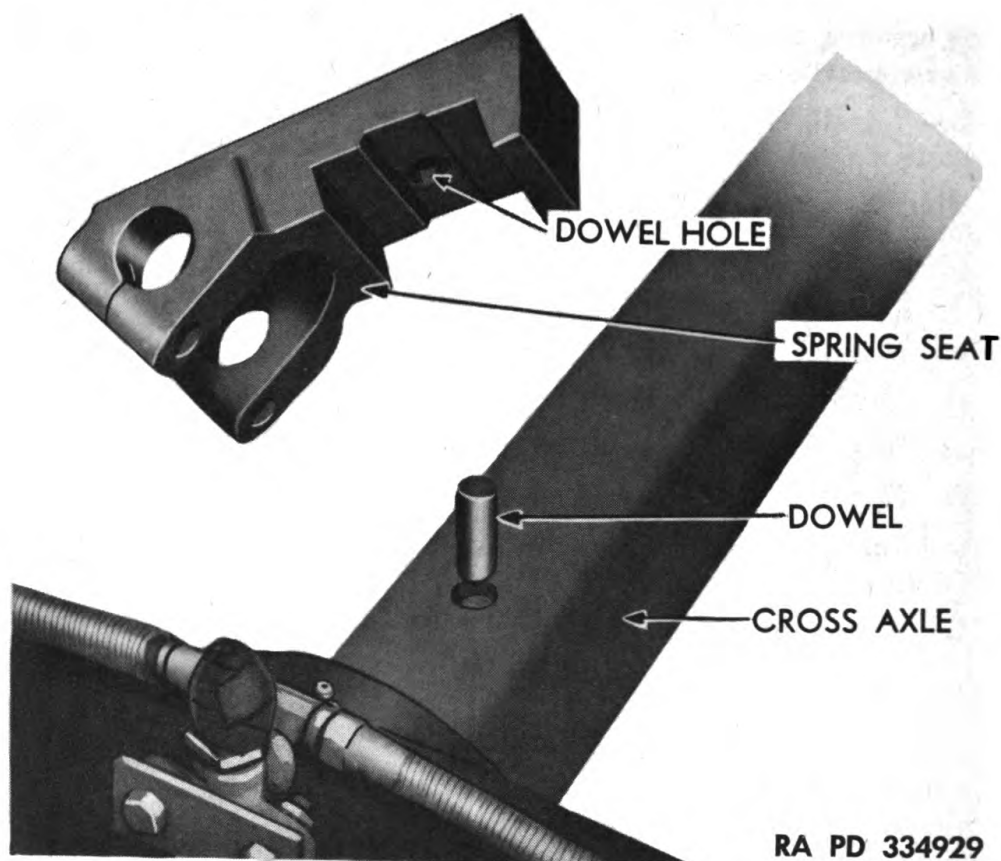
## Section XV

## CENTER CROSS AXLE

### 66. DESCRIPTION (figs. 103 and 104).

a. The center cross axle, or main axle, supports over 75 percent of the trailer gross load, and transmits this weight to the four rear wheels through two walking beams. The axle is a rectangular bar of tempered steel with bearing surfaces machined onto each tapered end. The two bearing surfaces of the spindle ride in the two steel bushings in each walking beam hub. A dowel locates a spring seat near each end of the upper side of the rectangular axle section. A pin, carried in two bosses in the front of each spring seat, shackles the rearward end of an adjustable radius rod. It is by means of these radius rods that the alinement of the axle is maintained.

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



**Figure 104 — Center Cross Axle Spring Seat and Dowel**

**67. REMOVAL.**

- a. **Support Body.** Jack up (fig. 111) or hoist rear of vehicle until there is a clearance of at least an inch between the tires and ground. Grease the upper surface of four 1- x 8-inch boards, and slide one board under each tire. Support each rear corner of body as shown in figure 112 so that lower surface of rear crossmember is 20 inches from the ground or floor.
- b. **Remove Walking Beam and Wheels Assembly** (par. 59).
- c. **Remove Radius Rod Shackle Pin** (par. 70 b).
- d. **Remove Axle.** Block up under each spindle end so that axle is well supported. Use a heavy socket, a ratchet, and a 4-foot handle, (fig. 109), and remove the eight spring clip nuts and internal-toothed lock washers. Use a soft hammer and drive spring clips upward through the lower spring plates until their ends are flush with the lower surface of the plates. Tap or pry plates off of clips. Support center of axle with the hydraulic jack, and remove the blocking under the spindles. Lower the axle and remove.

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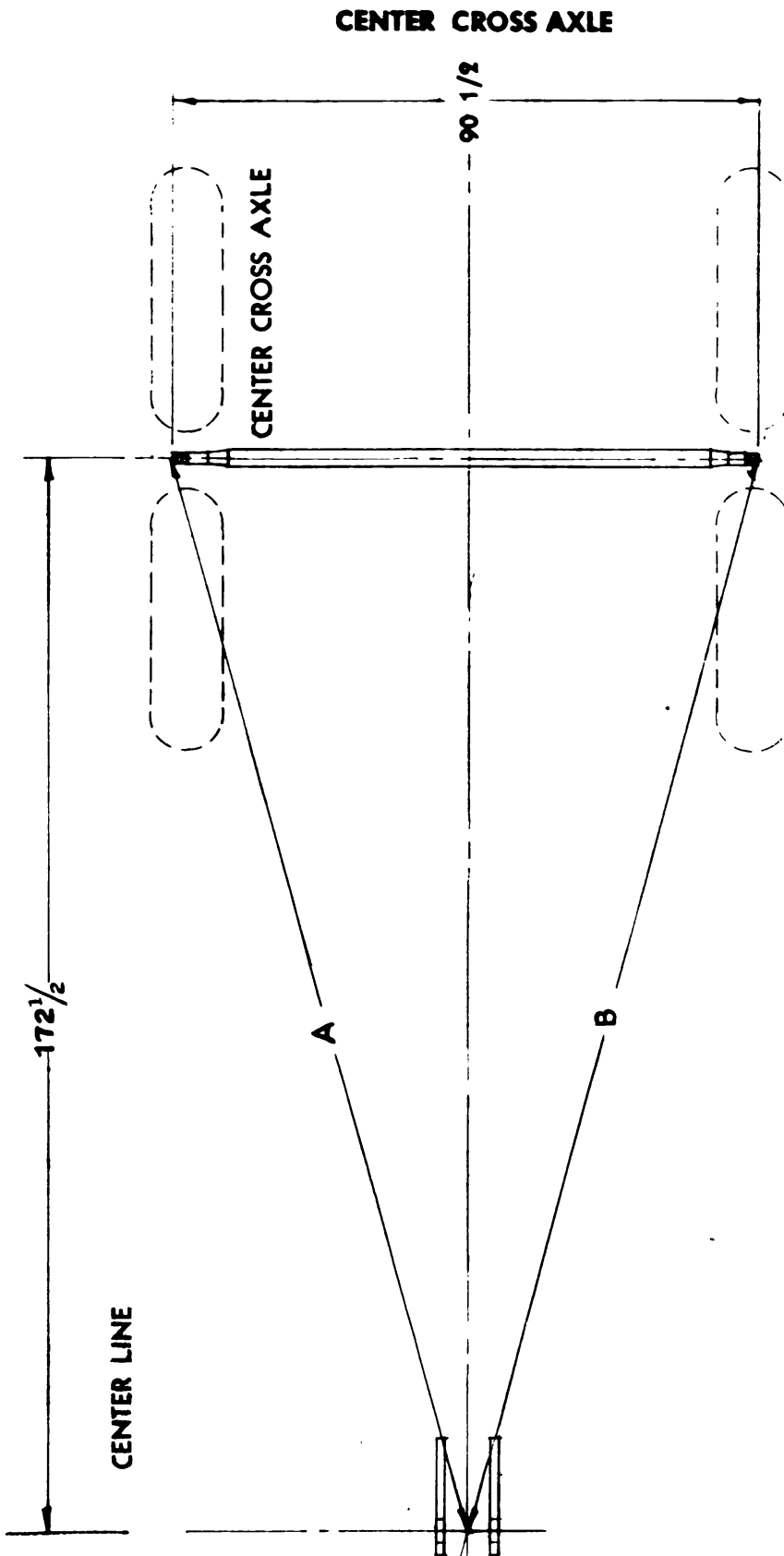
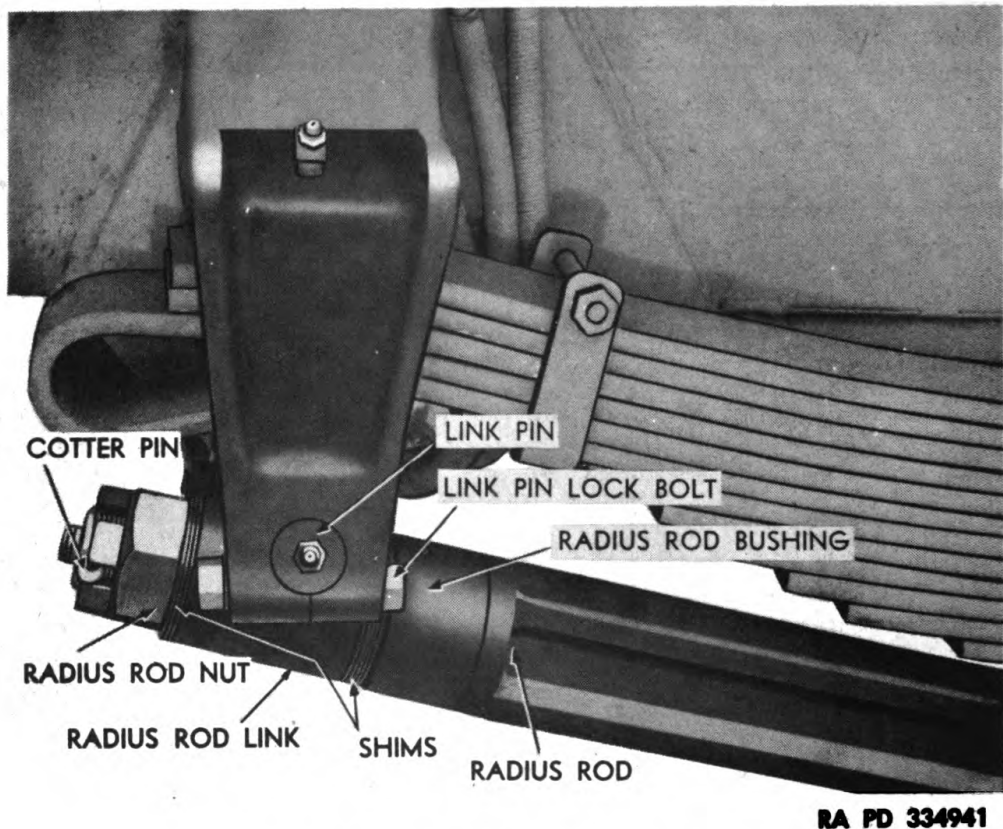


Figure 105 — Axle Alinement Guide

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**Figure 106 — Radius Rod Adjustment**

**68. INSTALLATION.**

a. **Position Axle in Vehicle.** Place axle under vehicle. Place dowels in their seats (fig. 104) and position spring seats over dowels with radius rod shackle toward the front. Two men lift axle, thus assembled, up under springs so that head of spring center bolt enters recess in top of spring seat. A third man supports the axle at the center with the hydraulic jack and blocks up under axle spindles.

b. **Attach Springs.** Drive spring clips down on holders (fig. 107). Install lower spring plate and secure with washers and nuts (par. 71 c). Raise axle as necessary to connect rearward end of radius rod. Refer to paragraph 70 c (2). Tighten radius rod nut.

c. **Install Walking Beam and Wheels Assembly** (par. 60).

d. **Check Axle Alinement.** Jack up or hoist body and remove blocking. Lower body, and remove jack or disconnect hoist. Check axle alinement (par. 69).

**69. AXLE ALINEMENT.**

a. **Position and Level Vehicle.** Place vehicle on a level floor. Support front of vehicle on landing gear. Remove the two front

## RADIUS RODS AND SPRINGS

wheel and tire assemblies. Remove both walking beam hub caps. Adjust landing gear so that vehicle is level.

b. **Check Alinement.** Drop a plumb bob from the center of each axle spindle to the floor and mark the floor at the contact point at the front of the vehicle. Locate a point midway between the connection plates on a line drawn through the center of the yoke block pin holes, and drop a plumb bob to the floor. Mark floor at contact point. Measurements A, and B, figure 105 must be within  $\frac{1}{8}$  of an inch of being the same.

c. **Aline Axle.**

(1) **REMOVE RADIUS ROD.** (par. 70 b).

(2) **TO MOVE AXLE FORWARD.** To lessen measurement "A" or "B" or to bring one axle spindle forward, remove necessary shims from radius rod between the link (fig. 106) and the bushing. Install radius rod (par. 70 c (2) ). *NOTE: Place the shims, just removed, on the radius rod between the nut and the link. Always note the number of shims removed and use that information as a guide, should further adjustments be necessary.*

(3) **TO REMOVE AXLE REARWARD.** With radius rod removed, take the necessary shims from between the radius rod link and nut, and place them on the rod between the link and bushing. Install the radius rod as in paragraph 70 c.

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## Section XVI

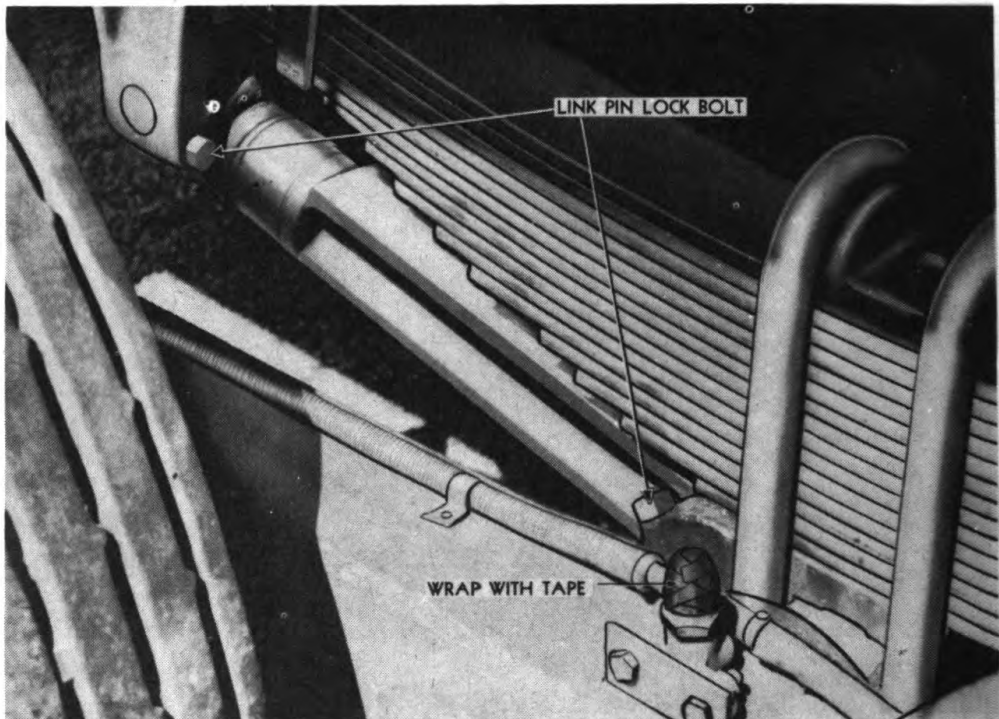
## RADIUS RODS AND SPRINGS

**70. RADIUS RODS** (figs. 106, 107 and 108).

a. **Description.** Two adjustable radius rods are employed to maintain the proper alinement between the center cross axle and vehicle body. The rearward end of each radius rod is shackled to the front of each spring seat (fig. 107). The front end of the rod (fig. 106) is locked into, and supported by, the radius rod link. The link is mounted on a link pin which is clamped by two bolts, in the split bosses at the bottom of the front shackle.

b. **Removal of Radius Rod.** Remove cotter pin and remove radius rod nut and shims from front end of rod (figs. 106 and 108). Remove nuts and internal-toothed lock washers from shackle pin locking bolts at rearward end of rod, and tap bolts up out of shackle. Use a drift from walking beam side of shackle, and drive out shackle pin. Pull radius rod rearward out of radius rod link. Remove the nuts and internal-toothed lock washers from the link pin lock bolts,

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RA PD 334921

**Figure 107 — Radius Rod Removal**

and tap bolts out of shackle. Push link pin either way out of shackle bosses and link.

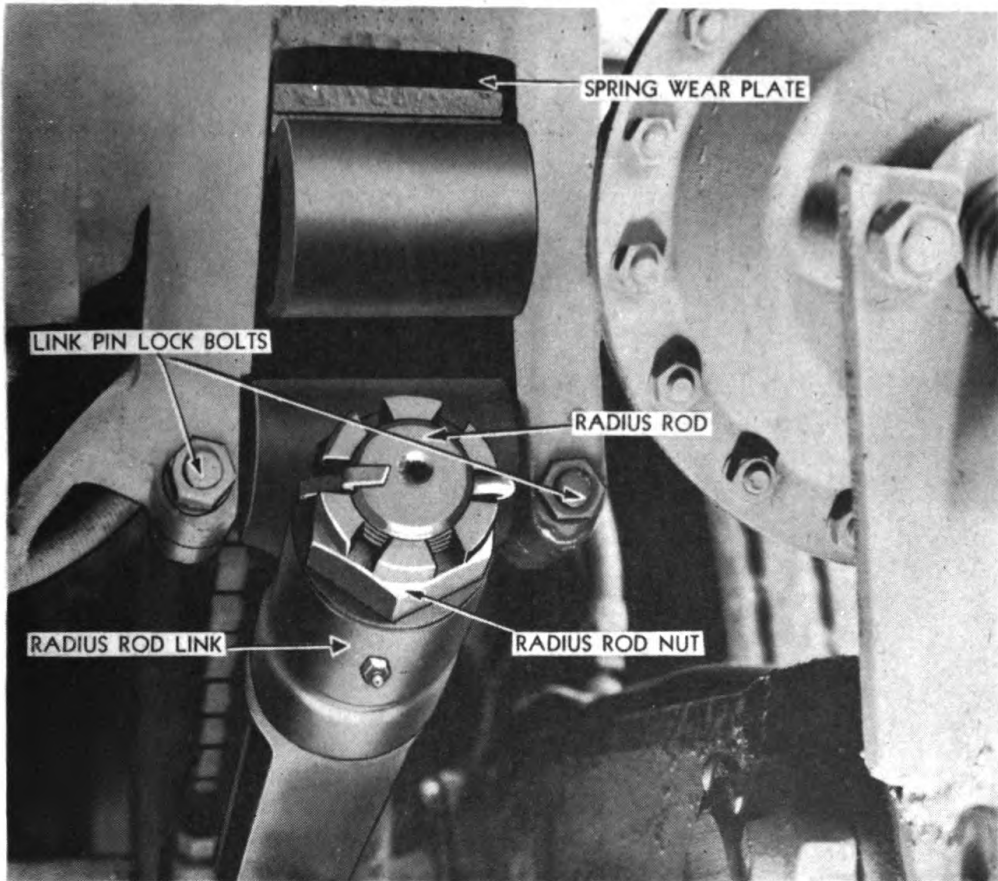
**c. Installation.**

(1) **INSTALL RADIUS ROD LINK.** Aline radius rod link between holes in link pin bosses in front shackle. Insert link pin so that milled lock bolt surfaces will aline with lock bolt holes in shackle and so that lubrication fitting will be on the outside with the pin installed. Push pin all the way in, and install locking bolts from rearward side of shackle. Install internal-toothed lock washers and nuts, and tighten.

(2) **INSTALL RADIUS ROD.** Place cone shaped bushing over threaded end of rod, and install the required number of shims. **NOTE:** *In manufacture, five shims are used at this point but in later axle alinements, it may be necessary to use more or fewer shims to effect the desired axle location.* Insert the threaded end of radius rod through the link, and install three shims or the number needed for proper alinement. Start nut onto threads. Aline rod in spring seat shackle and insert shackle pin so that milled surfaces will be alined with lock bolt holes. Push pin all the way in, and install lock bolts from the upper side of the shackle. Install internal-toothed lock washers and nuts, and tighten. Tighten radius rod nut, and install and lock cotter pin.



## RADIUS RODS AND SPRINGS



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**Figure 108 — Radius Rod Link Mounting**

d. **Radius Rod Adjustment.** Refer to paragraph 69.

### 71. SPRINGS.

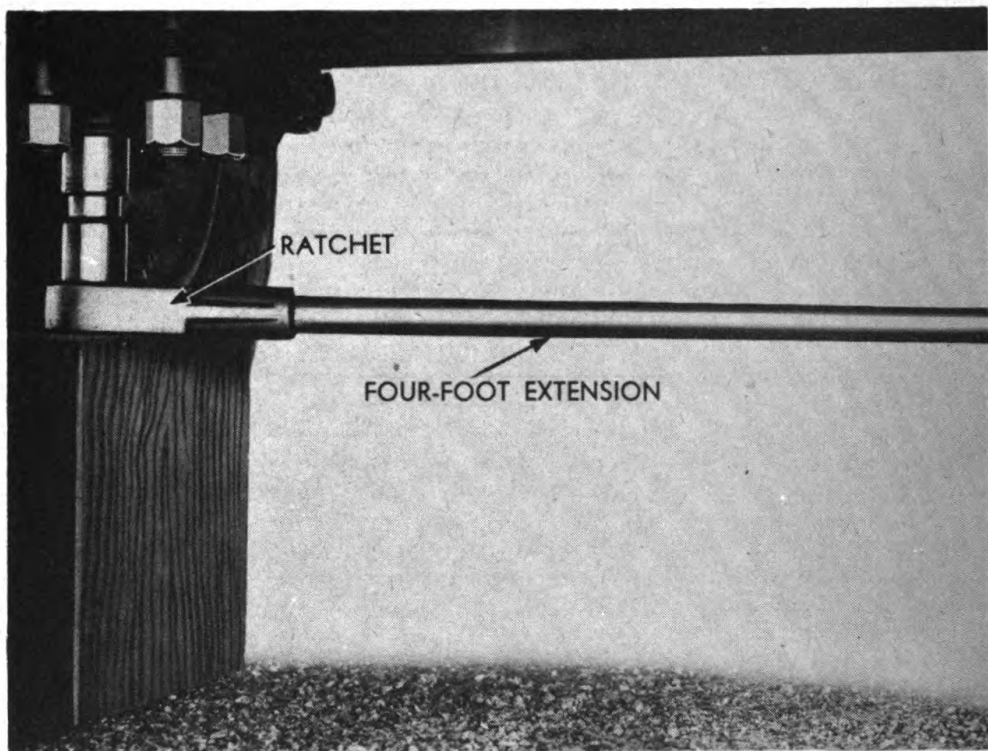
a. **Description.** Two slipper-type springs mounted on the center cross axle take the vehicle load from shackle wear plates which bear on the ends of the upper spring leaves. The radius rod link at the front, and a shackle bolt at the rear, retain the spring in shackle and limit vehicle rebound.

#### b. Removal.

(1) **REMOVE RADIUS ROD.** (par. 70 b).

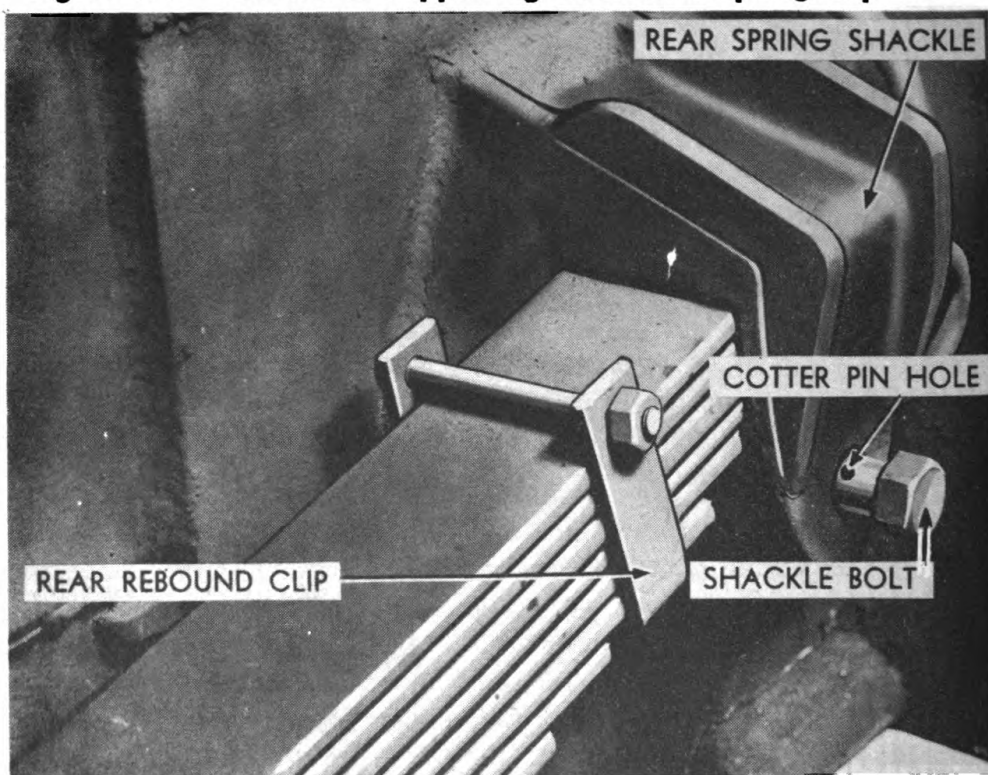
(2) **LOOSEN SPRING.** Block both sides of both rear wheels. Use a heavy socket and a ratchet with a 4-foot handle supported under the spring clips (fig. 109), and remove the four self-locking nuts and internal-toothed lock washers. Drive clips up as far as possible, and tap lower plate off the ends of the clips. Remove spring clips and clip holder (fig. 107). Remove cotter pin from rear shackle bolt, and screw bolt out of shackle (fig. 110).

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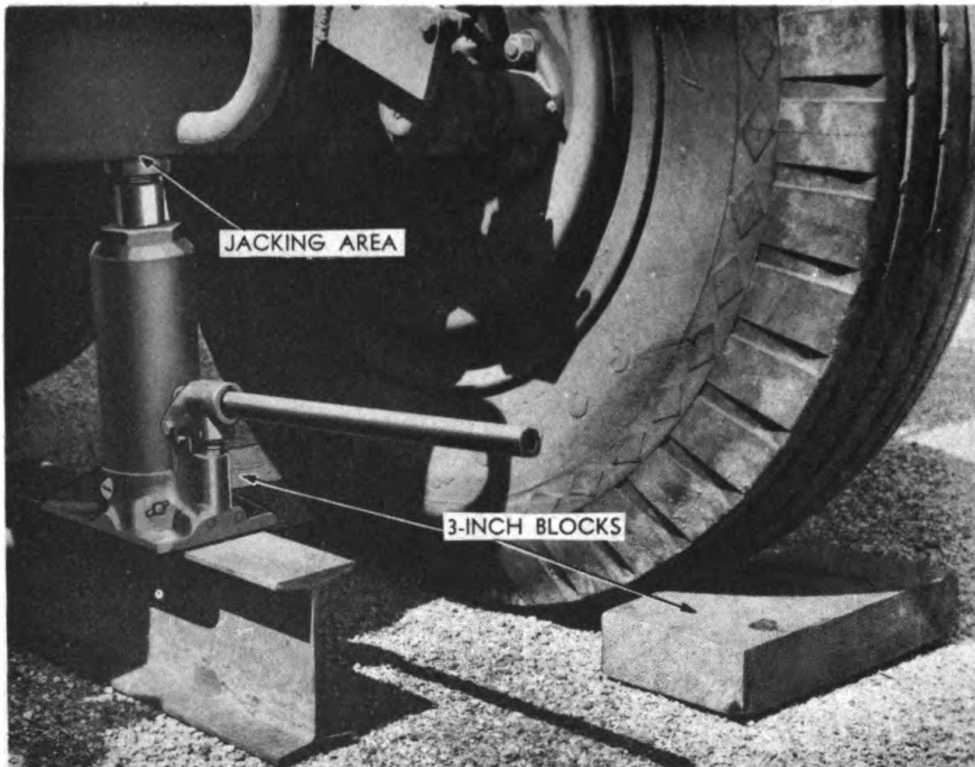
**Figure 109 — Method of Supporting Wrench At Spring Clip Nuts**



RA PD 334945

**Figure 110 — Rear Spring Shackle**

## RADIUS RODS AND SPRINGS



RA PD 334949

**Figure 111 — Jacking Area, Either Rear Corner of Body**

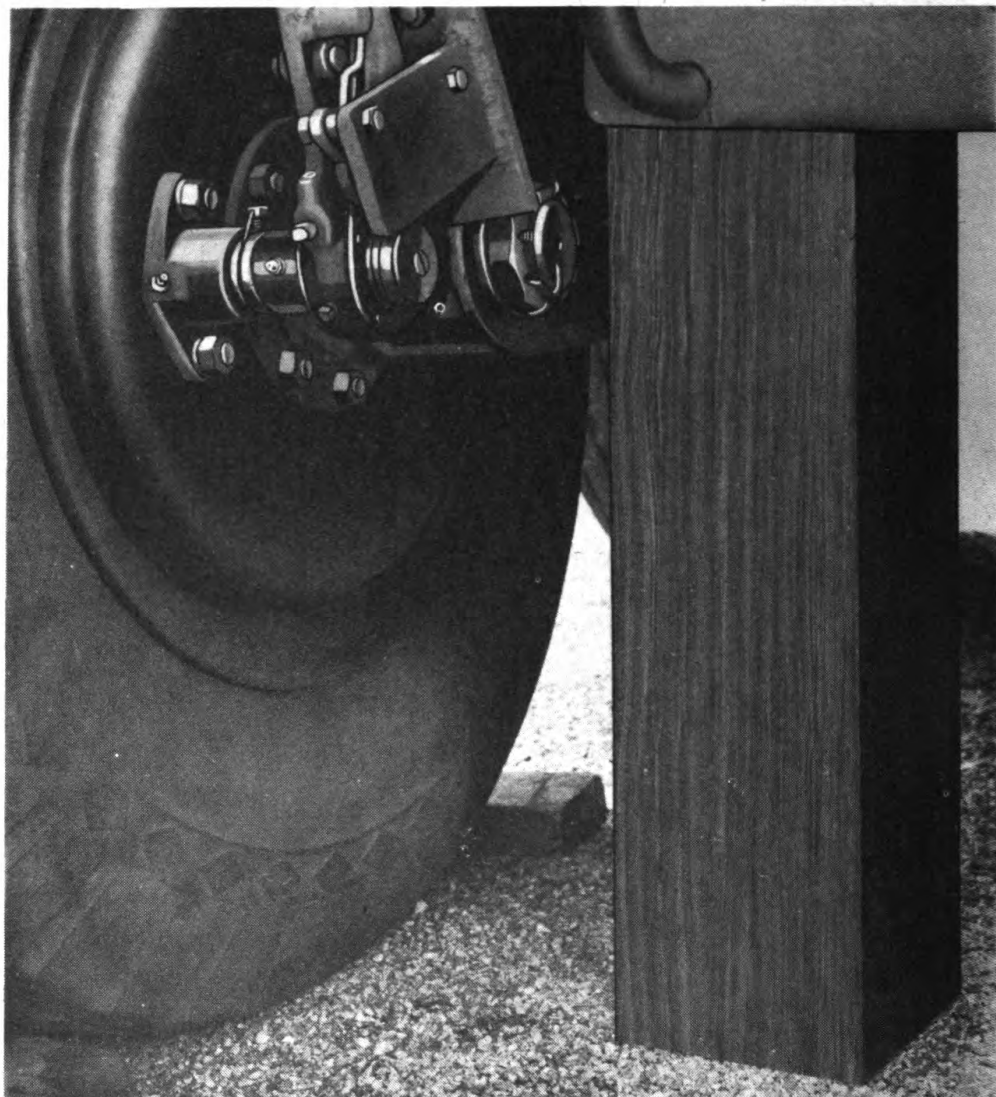
(3) **REMOVE SPRING.** Disconnect flexible air hose at walking beam and tape threads of connector body (fig. 113). Place jack under rear crossmember (fig. 111) and elevate corner of body until lower surface of crossmember is 20 inches above the surface of the floor or ground. Block corner of vehicle as shown in figure 112. Two men lift spring until head of spring center bolt clears hole in spring seat (fig. 113). Pull the spring forward out of the vehicle. Remove spring seat and dowel (fig. 104).

### c. Installation.

(1) **LIFT SPRING OVER AXLE.** Working from underneath the body, lift rearward end of spring to rest on axle. Continue to raise the rear of the spring so the butts of the leaves will clear the axle while a second man supporting the front of the spring pushes the spring rearward to within 8 or 10 inches of the rear shackle.

(2) **SECURE SPRING IN SHACKLES.** Use a wood block on the walking beam to protect the air line and to act as a lever fulcrum (fig. 114). Use a bar or wood lever over the fulcrum and under the spring to lift and guide rear of spring into shackle while a second man, at the front of the spring, pushes the spring rearward. Continue to support rear of spring and screw rear shackle bolt into place. Now support front of spring, while a second man installs radius rod link

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**Figure 112 — Rear Corner of Body Supported for Spring Removal**

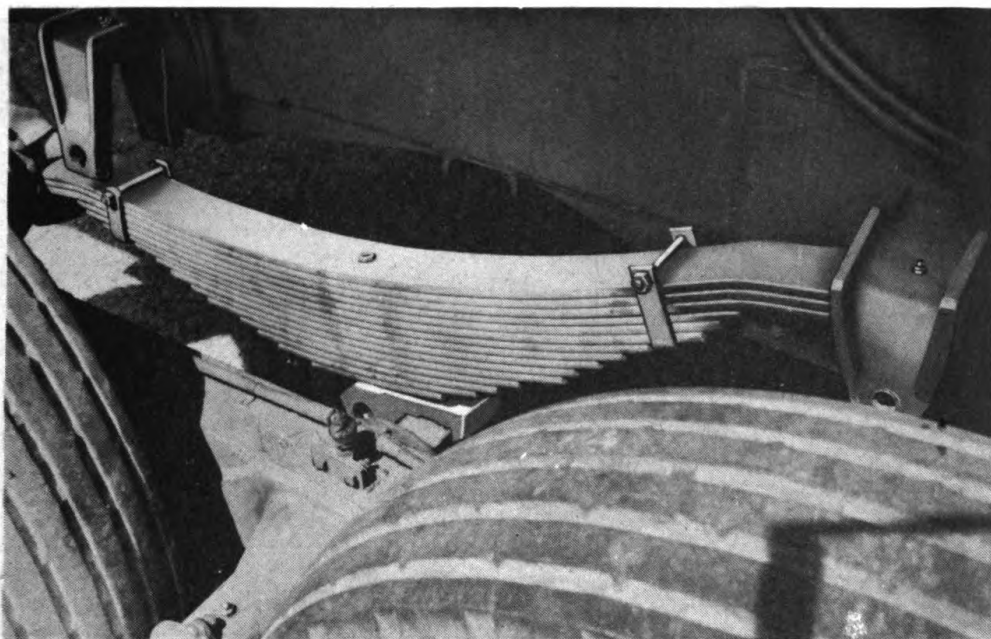
and link pin. Tighten rear shackle bolt, and install cotter pin. Install link pin lock bolts, and secure with washers and nuts. Install spring seat dowel and spring seat (fig. 115). Jack up under rear crossmember and remove blocking. Lower body slowly and guide head of spring center bolt into hole in spring seat.

(3) **SECURE SPRING TO AXLE.** Install clip holder and spring clips. Use a tool similar to the one illustrated in figure 116 and install lower plate over ends of spring clips. Install internal-toothed lock washers and self-locking nuts, and tighten. **NOTE:** Use heavy socket wrench equipment, supported as in figure 109. These spring clips must be drawn down tightly.

(4) **INSTALL RADIUS ROD.** Refer to paragraph 70 c (2).



## RADIUS RODS AND SPRINGS



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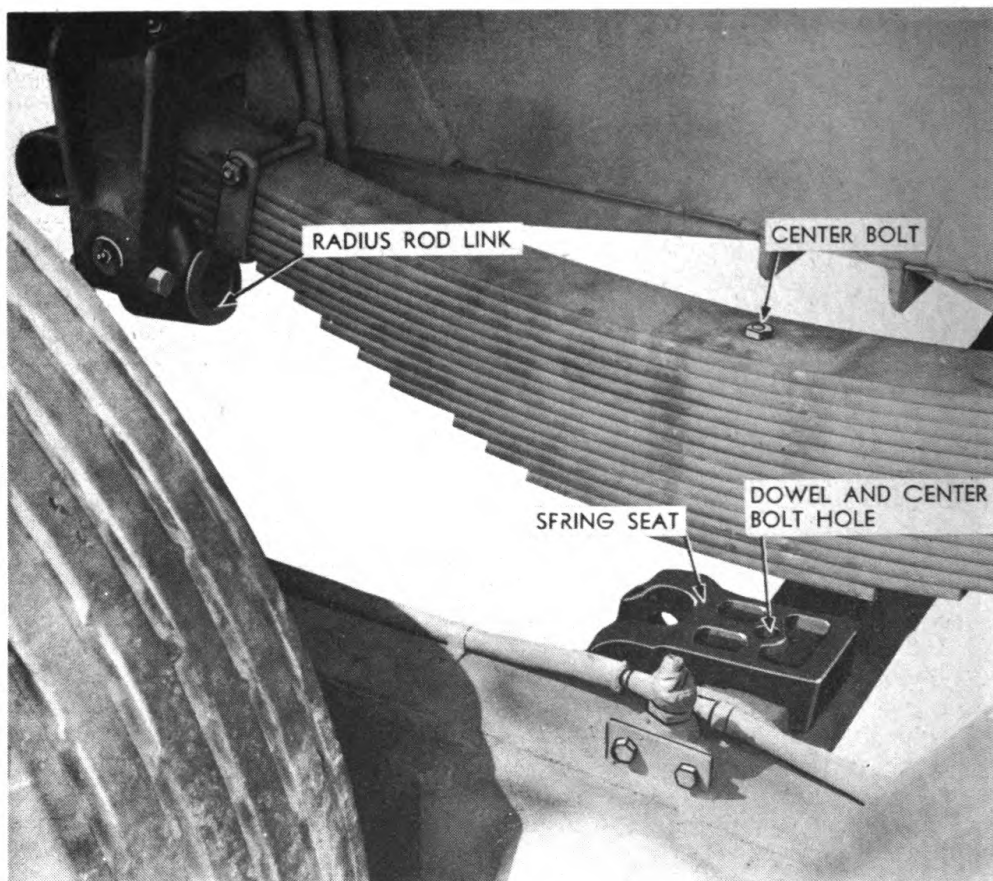
**Figure 113 — Pulling Spring Forward Out of Vehicle**



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**Figure 114 — Lifting Spring Over Axle Into Rear Shackle**

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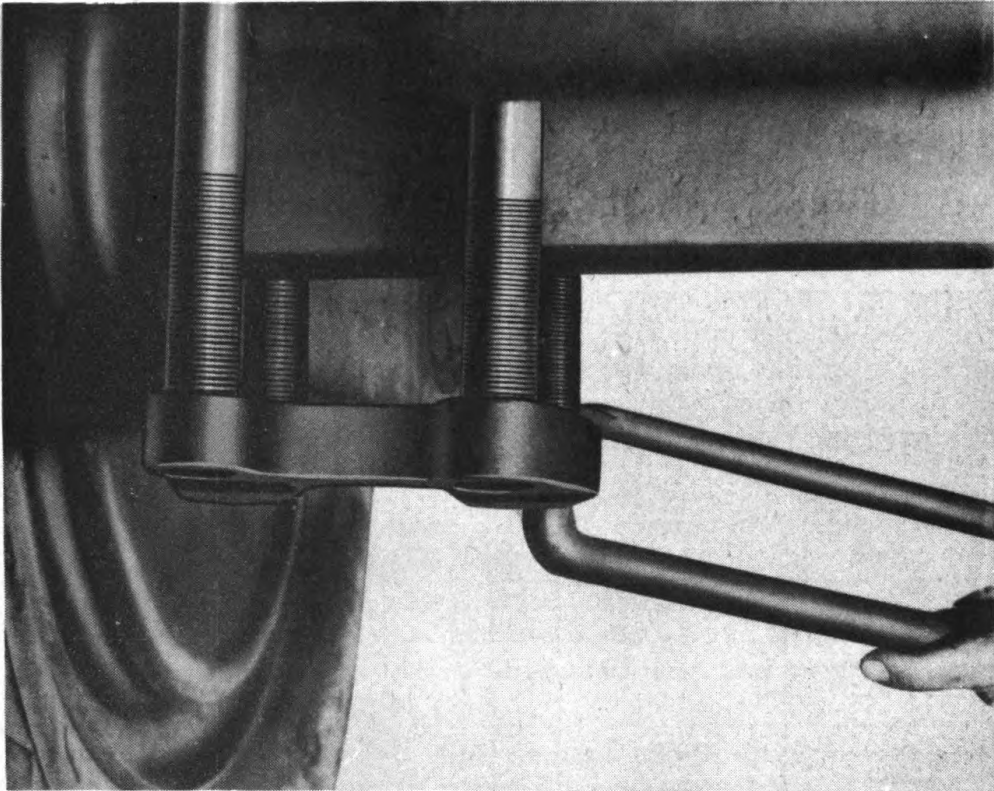


RA PD 334917

**Figure 115 — Spring Seat In Place**



## LANDING GEAR



RA PD 334939

**Figure 116 — Using Alining Tool To Install Lower Spring Plate**

### Section XVII

## LANDING GEAR

### 72. DESCRIPTION AND DATA (figs. 29, 30 and 117).

**a. Description.** The trailer landing gear is the gear-and-screw, telescoping-leg type (fig. 117). Eight bolts secure the assembly to brackets welded to the front center of the body. It is composed of two upper and two lower legs, two crank handles, one on either side of the vehicle, and a dolly suspended from tubular brackets welded to the lower ends of the two lower legs. In operation, the two cranks, through their common crankshaft, operate a set of two bevel gears at the top of each upper leg. The gear sets rotate screw shafts which lower or raise the lower landing gear legs and dolly.

#### **b. Data.**

|                      |              |
|----------------------|--------------|
| Make .....           | Bantam       |
| Weight .....         | 327 lb       |
| Stock numbers:       |              |
| Landing gear .....   | 9120-44A-510 |
| Crankshaft .....     | 0340-15187   |
| Crank w/handle ..... | 0340-15103   |

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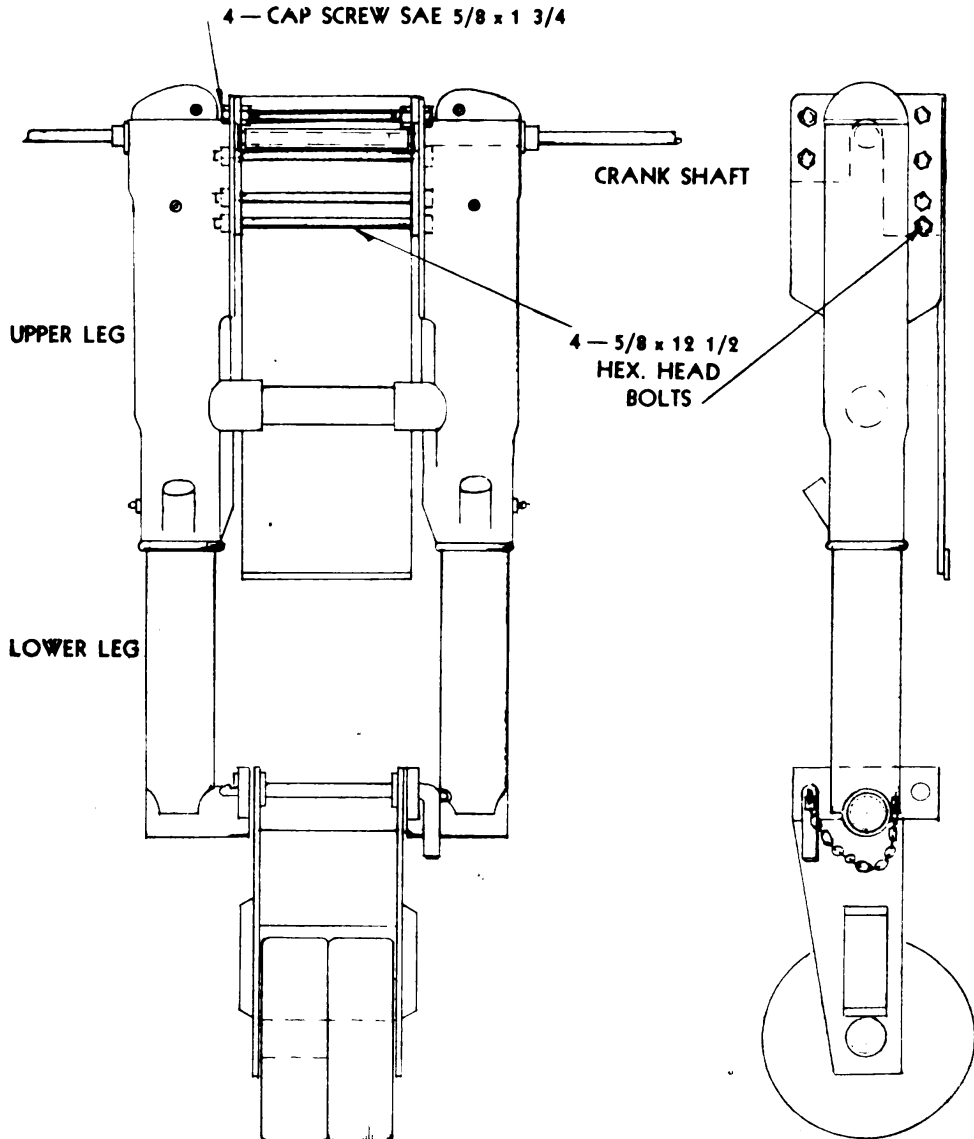


Figure 117 — Landing Gear Mounting

73. REMOVAL.

a. **Support Vehicle.** Apply parking brakes. If trailer is not supported by towing vehicle, block up under connection plates or attach a hoist at the lifting eyes to support front of vehicle. Lower landing gear lower legs and dolly or, if inoperative, place a support under the center of the tubular dolly bracket (fig. 29).

b. **Remove Landing Gear.** Remove the bolts, nuts, and lock washers securing the two crankshafts to the gear shaft, and separate shafts. Remove crankshafts and handles by pulling straight out of

## AMMUNITION RACKS

support bracket (fig. 29). Remove the two short bolts, nuts, and washers securing the front of each upper leg. Hold the long bolts to prevent turning while a second man removes the securing nuts and washers from inside the body (fig. 24). Remove long bolts, and remove landing gear.

### 74. INSTALLATION.

a. **Position Landing Gear.** Three men position the complete assembly vertically under the nose of the trailer with the side having the eight holes to the rear or next to the body bulkhead. Support as necessary to aline holes in legs with holes in mounting bracket, and install the two short bolts from inside of front of bracket through corresponding holes in each upper leg.

b. **Secure Landing Gear.** Install internal-toothed lock washers and nuts, but do not tighten. Aline rear holes in legs with holes in bracket, and install four long bolts from the right-hand side of the assembly, or so the nuts can be installed from inside the vehicle. Install internal-toothed lock washers and nuts, and tighten. Tighten the nuts on the four short bolts.

c. **Install Crankshaft and Crank.** Slide crankshaft assembly through outer bracket, and install crank handle support bracket. Push shaft on through hole in nose section and have a second man aline hole in crankshaft with hole in gear shaft connecting sleeve. Install second crankshaft in the same manner and so that the second crank handle is positioned the same as the first crank handle.

d. **Operation Test.** Extend both crank handles and operate the landing gear until it is supporting vehicle. Note any misalinement in crankshafts or any binding in lower legs. See that dolly swivels and locks properly. Remove blocking if used.

---

## Section XVIII

## AMMUNITION RACKS

### 75. DESCRIPTION.

a. The ammunition racks are described in paragraph 8 l.

### 76. REMOVAL.

a. Use a wrecker, or other hoist, from outside of vehicle and follow disconnecting instructions in paragraph 10 d (1) through (4). **NOTE:** *The vehicle trolley hoist boom is not long enough to permit removal of the assembly through the body doors.* Lift the tube and rack assembly out of the vehicle.

## TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

### 77. DISASSEMBLY AND ASSEMBLY.

a. **Disassembly.** With the tube and rack assembly supported in the center as in paragraph 76 a, slide end racks and locking levers or end racks and spacers off the hinge tube ends. Support hinge tube ends, and disconnect and remove hoist chain. Slide center rack and center post off hinge tube. **NOTE:** *The spacers are located at the hinge tube ends and between racks on the right-hand assembly. On the left-hand assembly, the rack locking levers are placed between racks and at the hinge tube ends.*

b. **Assembly.**

(1) **INSPECT PARTS.** Inspect tubular hinge sections on each rack for condition and alinement. Inspect locking levers and center post in same manner. See that over-lapping angles on right-hand racks are straight and that the weld securing each angle is intact. Check all welded joints in racks, levers, and posts for cracks.

(2) **ASSEMBLE RIGHT-HAND HINGE TUBE AND RACKS.** Support ends of hinge tube. Position center rack, the one having the support chain, so that holes having the steel grommets are on the lower surface of the rack, and lever locking chain is rearward. Slide one tubular hinge over the hinge tube end. Position center post so that side of post which is flush with tubular section will face away from the rack. Slide center post onto tube and follow with second hinge of rack. Install spacer on tube. Follow with rearward section positioned so the locking chain is rearward. Place spacer over rearward end of tube. Install spacer from front end of tube against center section. Install front section, and place spacer on front end of tube.

(3) **ASSEMBLE LEFT-HAND HINGE TUBE AND RACKS.** Assemble center rack and center post as in subparagraph (2) above. **NOTE:** *Center rack on left hinge tube has no lever locking chains but does have an attached support chain.* Assemble balance of left-hand assembly the same as described in subparagraph (2) above, using locking levers where spacers were used in the right-hand assembly. Have curved surface at end of locking levers face in the same direction as the grommet-bushed holes in the shell racks.

### 78. INSTALLATION.

a. Loop the load chain, of the hoist to be used, about 16 inches from the load hook, and insert between hinge tube and center rack at the approximate center of the assembly. Take load hook over the hinge tube and engage in loop as illustrated with trolley hoist in figure 33. Lift assembly into vehicle with grommet-bushed rack holes toward outside of vehicle and enter front end of hinge tube in desired hole in front support post (fig. 24). See that racks and spacers are

## TROLLEY HOIST

pushed all the way forward on tube, and secure rear end of tube in correct slot in rear support bracket (fig. 35). Aline center post with hole in body, and install center post bolt from inside of vehicle. Install washer, nut, and cotter pin. Disconnect hoist.

### Section XIX

## TROLLEY HOIST

### 79. DESCRIPTION AND DATA.

a. **Description.** The trolley hoist components are described in paragraph 14. Assembly of trolley hoist components into a lifting unit is described in paragraph 15. Maintenance of the hoist by using troops is limited to lubrication and the replacement of hand chain sheave, chain, and brake parts, onto chain hoist.

b. **Data.**

(1) **CHAIN HOIST.**

Make ..... Yale and Towne

Model ..... BB ½-Ton

(2) **TROLLEY.**

Make ..... Yale and Towne

Model ..... ½-Ton Whiz

### 80. CHAIN HOIST.

a. **Removal of Hand Chain Sheave and Brake.**

(1) **REMOVE CHAIN GUIDE AND CHAIN.** Support chain hoist with hand chain sheave uppermost. Remove nut and washer from bolt securing the two segments of hand chain guide, and remove bolt and spacer. Remove the cap screw and washer which fastens the upper end of each segment, and remove chain guide and chain.

(2) **REMOVE SHEAVE AND BRAKE DISKS.** Remove cotter pin, nut, and check washer retaining hand sheave on disk hub worm, and remove hand sheave, iron disk, ratchet disk, leather disk, and disk hub, from driving pinion shaft. Remove screw securing ratchet pawl and remove pawl, spring, and spring guide.

b. **Installation of Hand Chain Sheave and Brake.**

(1) **CLEAN AND INSPECT PARTS.** Clean metal parts with dry-cleaning solvent, and wipe all foreign material from leather disk using a clean cloth. If worn or scuffed, replace the leather disk. If hand sheave, iron disk, or ratchet disk are grooved or badly worn at braking surfaces, replace all three parts. See that driving pinion shaft is in good condition and that the key is tight in the keyway.

## TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

### (2) INSTALLATION OF BRAKE DISKS AND HAND SHEAVE.

(a) *Install Brake Parts and Sheave.* With chain hoist positioned as in paragraph 80 a above, align keyway in disk hub with key on drive pinion. Set disk hub onto shaft and into case with the worm screw end of the hub uppermost. Install leather disk, ratchet disk and iron disk onto disk hub in that order. Turn hand sheave onto worm screw of disk hub with brake contacting surface down or toward iron disk. Install check washer, nut, and cotter pin. Install ratchet pawl spring, spring guide and pawl and secure with screw.

(b) *Install Chain and Chain Guide.* Place chain in sheave. Place the upper ends of the two chain guide segments into their respective slots in the case, and secure with cap screws and lock washers. Bring lower ends of segments together and install spacer, bolt, nut, and washer. NOTE: *Have chain in guide so that the spacer separates the two columns of chain.*

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## Section XX

### BODY

#### 81. DESCRIPTION.

a. The trailer body is fabricated entirely by welding. It is composed of two main sections: the nose section (fig. 14) and the main body section (fig. 24). The nose section provides towing facilities, mounts air hose connectors and electrical controls, and encloses the trailer landing gear. The main body section is devoted chiefly to the ammunition well, but also provides compartments for stowage of tools, the trolley hoist components, and the spare wheel.

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## Section XXI

### ELECTRICAL SYSTEM

#### 82. DESCRIPTION AND DATA.

a. **Description.** The ammunition trailer is provided with a 6-8-volt electrical system illustrated in figure 118. Current is supplied by the towing vehicle through a jumper cable connecting a socket at the rear of the prime mover with a similar socket located on the nose section of the trailer (figs. 5, 6, 14, and 20). The trailer system, so connected, is controlled by the lighting switches on the prime mover when service lights are used. Blackout lights, on the trailer, are controlled by the blackout switch on the trailer nose section.



# ELECTRICAL SYSTEM

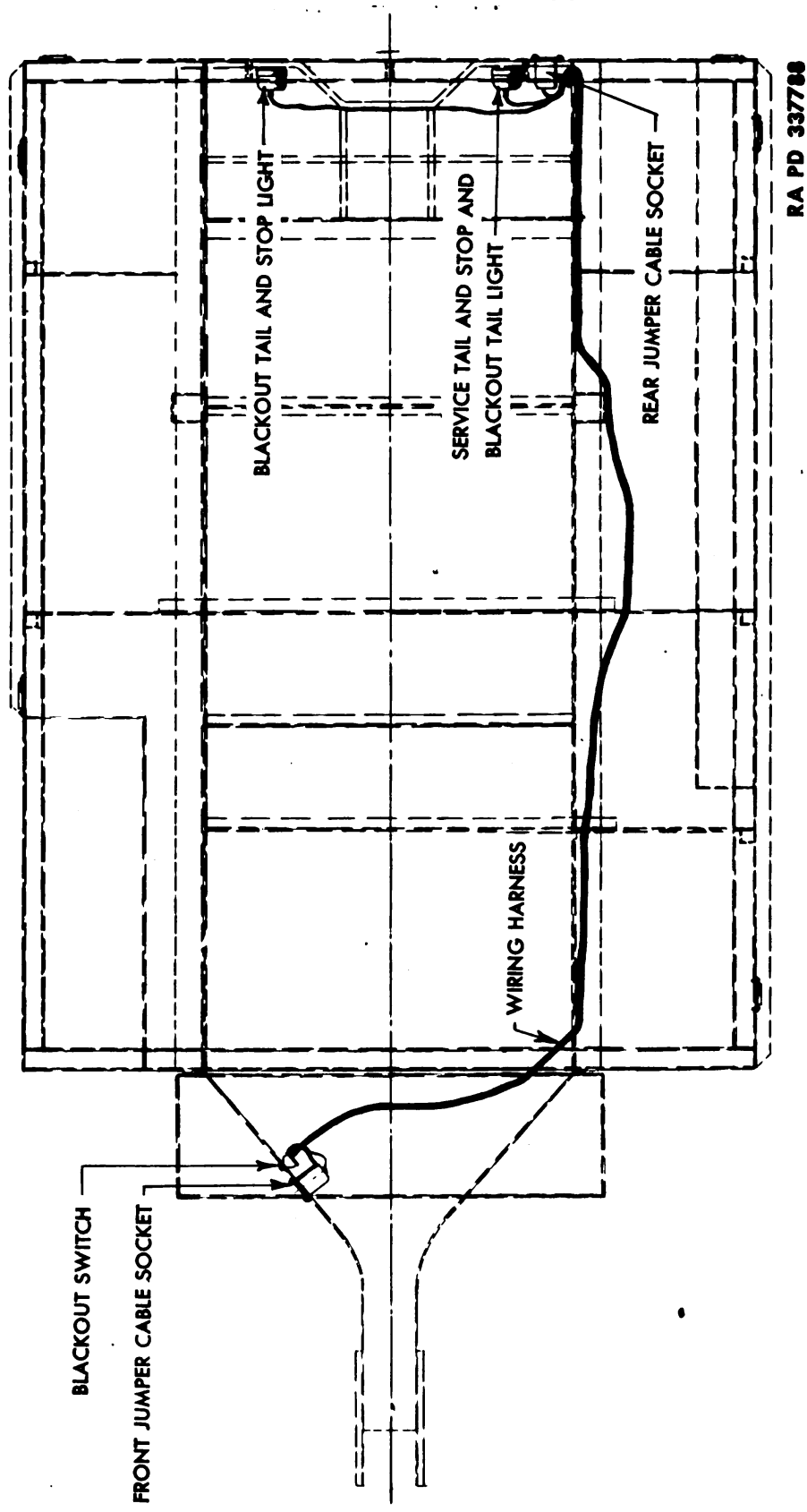
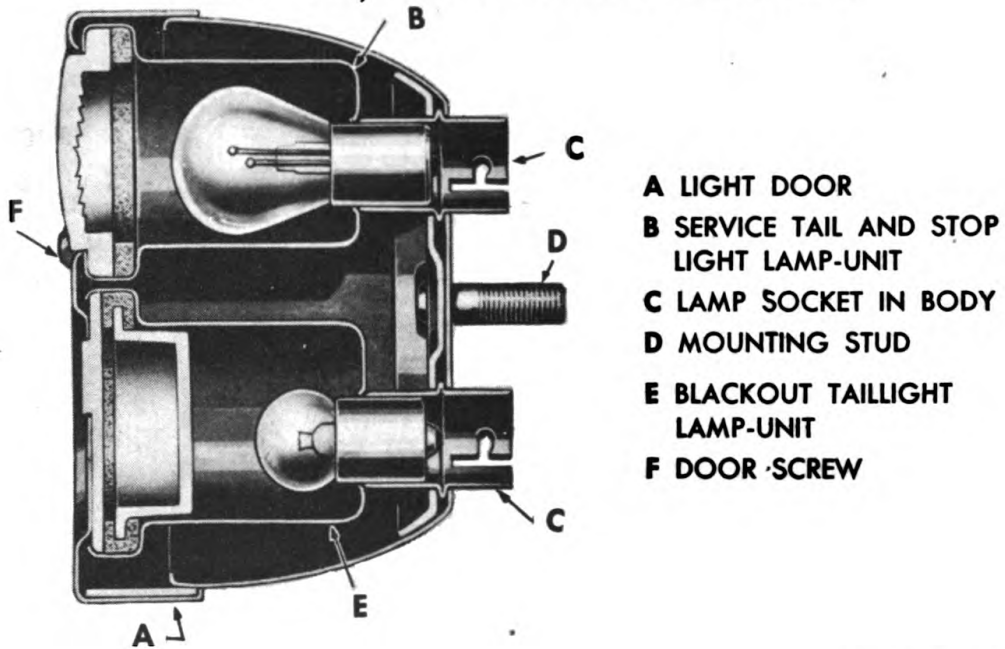


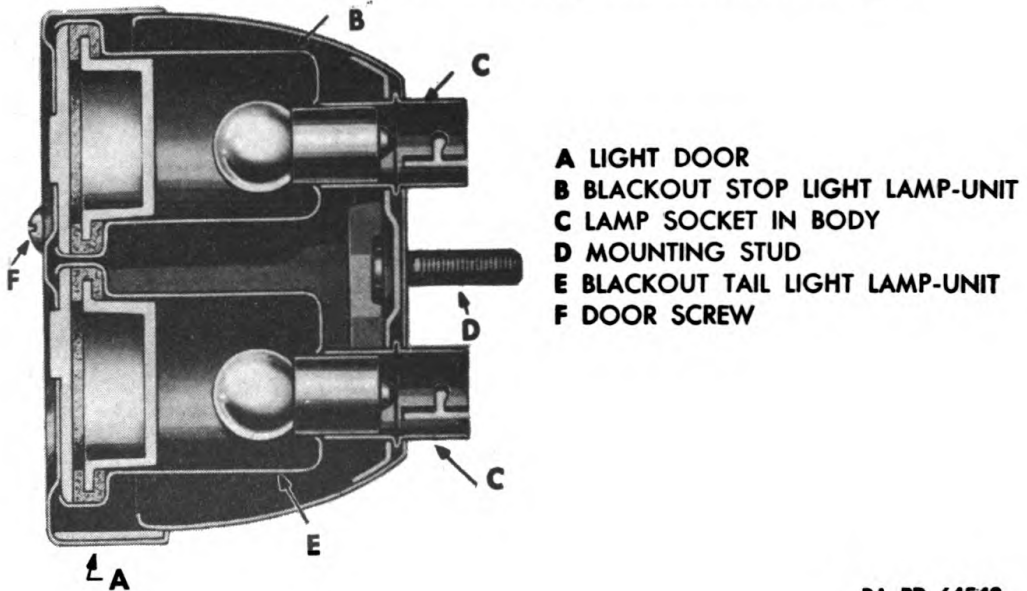
Figure 118 — Electrical System

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 64552

Figure 119 — Service Tail and Stop and Blackout Taillight



RA PD 64548

Figure 120 — Blackout Tail and Stop Light

b. Data.

(1) LIGHTS.

|                                                        | Stock Number |
|--------------------------------------------------------|--------------|
| Blackout tail and blackout stop light.....             | G200-7067175 |
| Service Taillight and stop and blackout taillight..... | G200-7067176 |

## ELECTRICAL SYSTEM

| (2) LAMPS (SEALED UNITS).             | Stock Number  |
|---------------------------------------|---------------|
| Blackout stop lamp-unit .....         | M-1-01-07408  |
| Blackout tail lamp-unit .....         | M-1-01-07407  |
| Service stop and tail lamp-unit ..... | M-1-01-07416  |
| (3) WIRING HARNESS .....              | 9550-10-318-1 |
| (4) JUMPER CABLE SOCKET .....         | 9400-3529     |
| Dust shield .....                     | F226-02-42470 |
| Cover .....                           | G74-01-00-218 |
| (5) JUMPER CABLE .....                | 9400-3760     |
| (6) BLACKOUT SWITCH .....             | 8-5-8625      |

### 83. TESTING LIGHTING CIRCUIT.

a. **No Trailer Lights Operate.** If lights on towing vehicle operate properly and all trailer lights are inoperative, use a test lamp on one of the connections at the trailer end of the jumper cable to determine if current gets to the trailer. If the test lamp lights, the trouble is between the jumper cable socket and the lights on the rear of the trailer. See that all connections on back of socket and blackout switch are in place, and tightly installed. See that connectors are properly plugged into all lamp-units. Use test lamp on connector contacts. If test lamp lights, the lamp in the circuit being tested is burned out. If test shows that current reaches blackout switch terminals and no current reaches connector plugs at lamps, replace wiring harness (par. 85).

### 84. LIGHTS.

a. **General.** A combination blackout taillight and blackout stop light (fig. 120) is mounted on the right side of the vehicle on the rear crossmember. A combination service taillight and stop and blackout taillight (fig. 119) is mounted on the rear crossmember on the left side of the vehicle. All lamps in these combination lights are sealed units. When any one of the four lamp-units burn out, replace the lamp as a unit. Removal and installation procedures are the same for all lamp-units.

#### b. Sealed Lamp-unit.

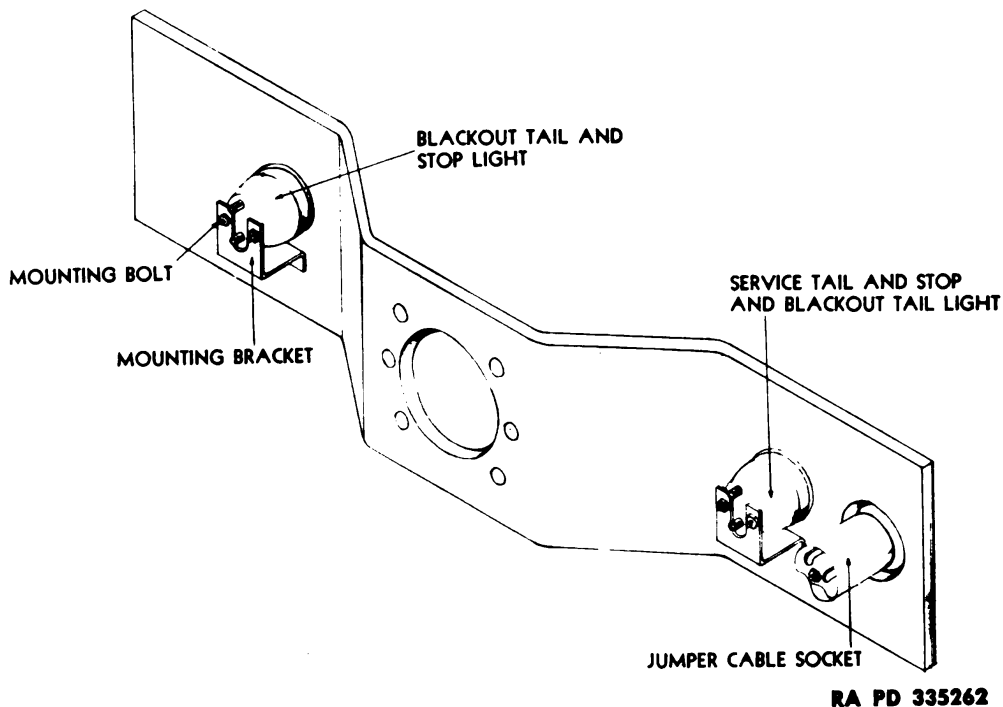
(1) **REMOVAL.** Remove two screws securing light cover, and remove cover. Pull either lamp-unit or both units out of light body.

(2) **INSTALLATION.** Insert proper unit into light body. Install light cover, and secure with cover screws.

#### c. Light Assembly.

(1) **REMOVAL.** Working from under side of rear crossmember,

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**Figure 121 — Light and Socket Mounting**

disconnect plugs from lamp-unit. Loosen nuts on mounting studs, and remove light assembly.

(2) **INSTALLATION.** Position light with mounting studs in slots in mounting bracket, and secure with lock washers and nuts.

**85. WIRING HARNESS.**

a. **Description.** All of the wiring on the trailer is encased in a protecting fabric loom or harness. Openings are provided in this fabric covered wiring assembly to allow for connecting wires of the various circuits to their respective terminals. The wiring harness is attached, with the brake air lines, to the left side of the trailer body by means of clamps secured by self-tapping screws and lock washers. Figure 122 illustrates the wiring harness, the wires which branch off from the main assembly and the terminal to which each wire is attached.

b. **Removal.** Loosen terminal screws at rear of blackout switch and disconnect the six wires. Remove brass nut and internal-toothed lock washer from socket cap bolt, and remove ground wire terminal and socket cap. Remove the three jam nuts and three nuts securing the three leads at socket base, and remove wires. Disconnect plugs at both rear lights. Loosen clamps along left side of body sufficiently to release harness. Pull harness out of vehicle.

c. **Installation.** Insert end of harness having lamp connector

# ELECTRICAL SYSTEM

RA PD 335263

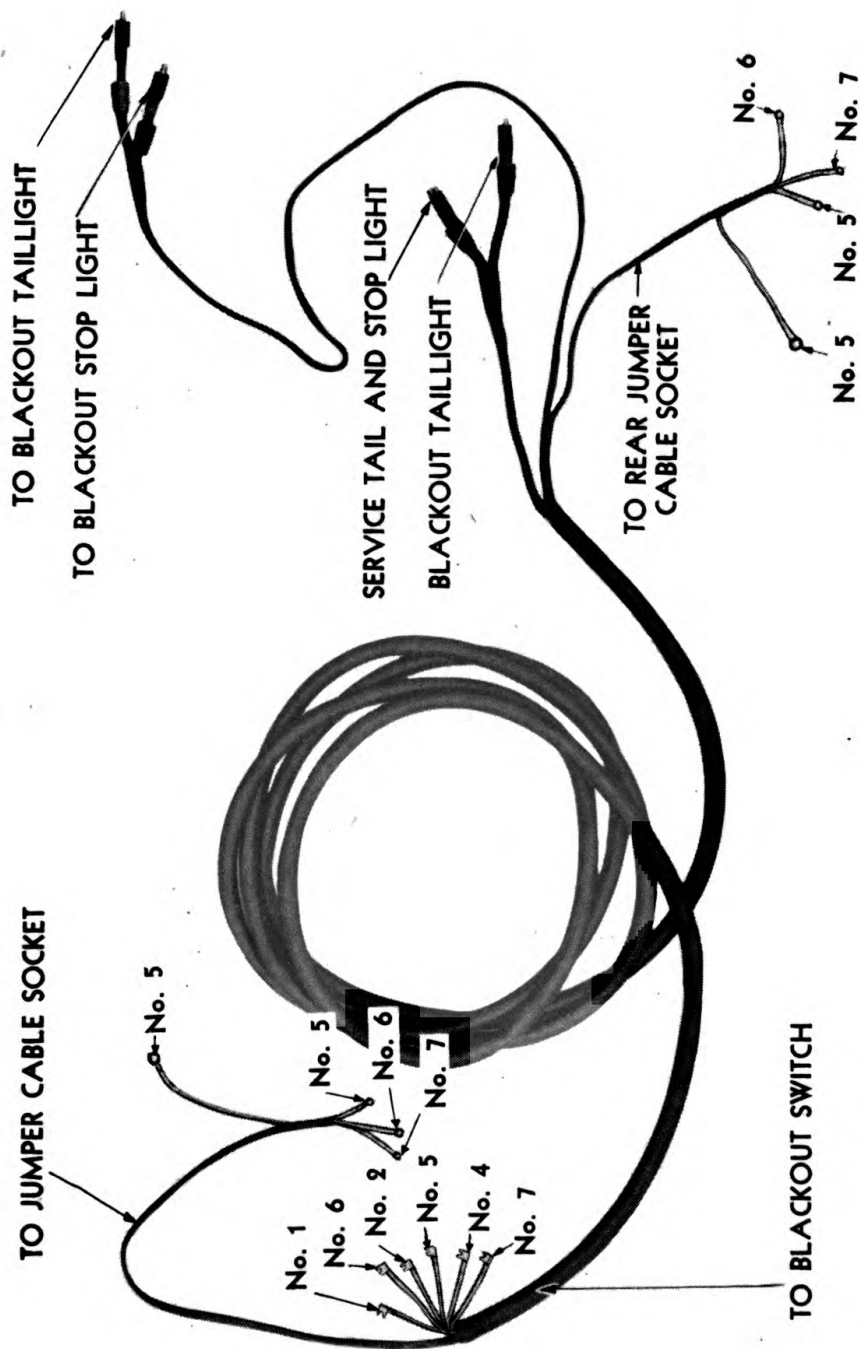


Figure 122 — Wiring Harness

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RA PD 335264

**Figure 123 — Jumper Cable Socket**

plugs through hole in body at rear of left spring. Connect branch of harness, having four wires, to jumper cable socket as in paragraph 86 b. Connect the plug having two terminals in the service tail and stop light and its companion plug in the blackout light receptacle in the lower part of the light body. The shorter lead of the second pair of lamp terminals attaches to blackout stop light and the longer lead to the blackout taillight or lower receptacle in the right-hand light body. Run the harness through the holes provided through the three gussets on the left side of the body and into the nose section. Connect the front jumper cable socket as described in paragraph 86 b. Connect the blackout switch as described in paragraph 87 c. Adjust harness to give ample slack in the nose section, and secure along the side of the body with the clamps provided.



## ELECTRICAL SYSTEM

### 86. JUMPER CABLE SOCKET.

a. **Removal.** Remove the four screws, nuts, and washers securing socket cover, dust shield retaining ring, and dust shield. Pull socket and wiring out of trailer nose section, and remove nut and internal-toothed lock washer which secures ground wire and socket cap. Remove cap. Remove three jam nuts from the three wired socket terminals. Remove three nuts securing wire terminals, and remove the cupped washers and wires.

b. **Installation.**

(1) **WIRE SOCKET.** Pull harness out through socket mounting hole. Remove cap nut and washer, and remove cap. Remove the two hex nuts and terminal cup washer from the three terminal posts SL, GR, and TL. Install terminal of wire No. 6 on socket terminal post SL, No. 7 wire on post TL and the shorter No. 5 wire on post GR. Install terminal cup washers and nuts, but do not tighten. Set socket cap in place and arrange terminal cup washers so that wires are guided through slots in cap. Remove cap, tighten terminal nuts, and install jam nuts and tighten. Install cap and the No. 5 wire remaining and secure wire and cap with cap bolt nut and washer.

(2) **INSTALL SOCKET.** Position socket in mounting hole with terminal guide down and with holes in flange, alined with mounting holes in body. Position dust seal or shield with guide slot correctly alined and install retainer ring, securing both with the two lower mounting screws. **NOTE:** *Nuts and washers must be applied by a second man from inside nose section.* Place the other two screws into holes in cover assembly through the two upper holes in retaining ring and body, and secure with nuts and lock washers.

### 87. BLACKOUT SWITCH.

a. **Description.** The blackout switch (figs. 20 and 118) is located on the right-hand side of the trailer nose section. Turning the slotted switch shaft diverts the current from the service light to the three sealed blackout units.

b. **Removal.** Remove nut and internal-toothed lock washer used to secure the switch in the body. From under side of nose section, pull blackout switch out of mounting hole and down as far as the six attached wires permit. Remove the three screws and washers attaching switch cover, and remove cover and gasket. Loosen the six terminal screws and disconnect wires. Pull wires out of holes in switch body. Install cover gasket, cover screws, and washers.

c. **Installation.** Remove three screws and washers securing cover, and remove cover and gasket. Insert wires Nos. 6 and 7 through one of the holes in the switch body. **NOTE:** *Each of the six terminals*

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*is identified by a two-letter marking on the insulator under the terminal.* Connect wire No. 6 to terminal SL and No. 7 wire to terminal TL. Use a hack saw or a 1/2-inch drill to increase the size of the second hole in the switch body. File new hole smooth. Insert the four remaining wires. Connect No. 4 to terminal BS; No. 1 to terminal ST; No. 3 to terminal BT and No. 2 to terminal SS. See that all terminals are in back of the internal-toothed lock washers, and tighten terminal screws. Install switch cover and gasket, and fasten with three washers and screws. Support switch in mounting hole while a second man installs internal-toothed lock washer and nut. Connect to prime mover, and check service and blackout sides of switch.

**88. JUMPER CABLE.**

a. Do not attempt to repair a defective jumper cable if a serviceable cable is available. In an emergency, splice, and tape, the wires as necessary. Replace with a serviceable cable as soon as possible.

---

**Section XXII**

**PINTLE**

**89. DESCRIPTION.**

a. A heavy duty spring loaded pintle is mounted on the trailer rear crossmember (fig. 15). Its purpose is to provide a towing attachment for a 6-wheel trailer.

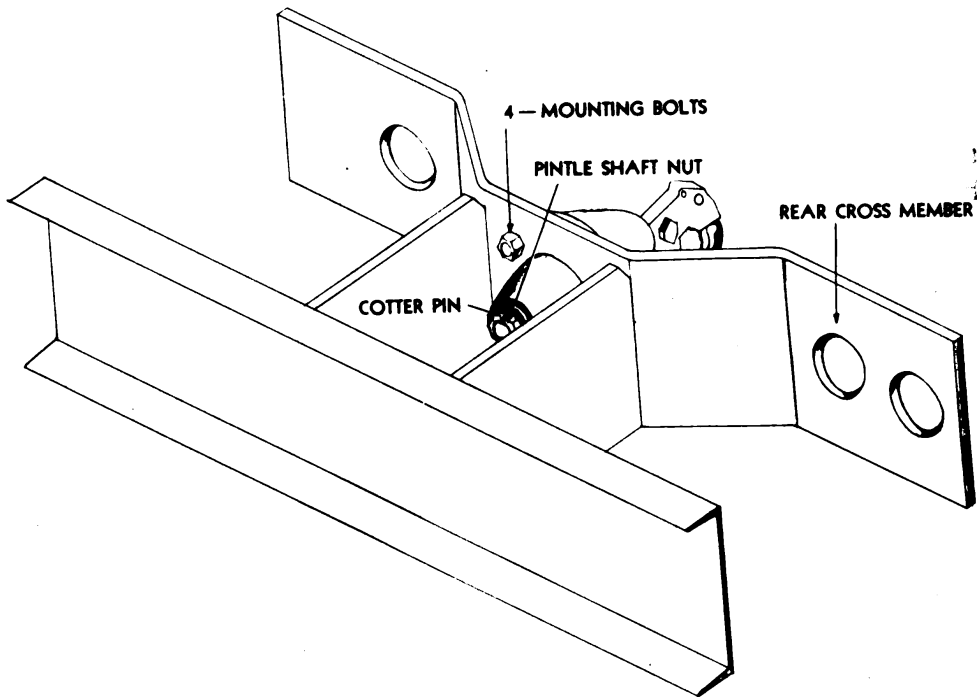
**90. REMOVAL.**

a. Working from under side of body, hold mounting bolt nuts, while a second man outside turns the bolts out of the nuts. Remove nuts and washers. Pull the pintle assembly and mounting bolts rearward out of the crossmember.

**91. INSTALLATION.**

a. Set the pintle assembly into the mounting hole in the rear crossmember so that mounting bolt holes are alined and with the lubricant plug toward the left side of the vehicle. Install mounting bolts from outside. Have a second man, underneath the crossmember, install lock washers, and start the mounting bolt nuts (fig. 124). Tighten bolts, while the second man secures the nuts against turning.

## HEAVY CARRIAGE LIMBER M5



RA PD 335265

**Figure 124 — Pintle Mounting**

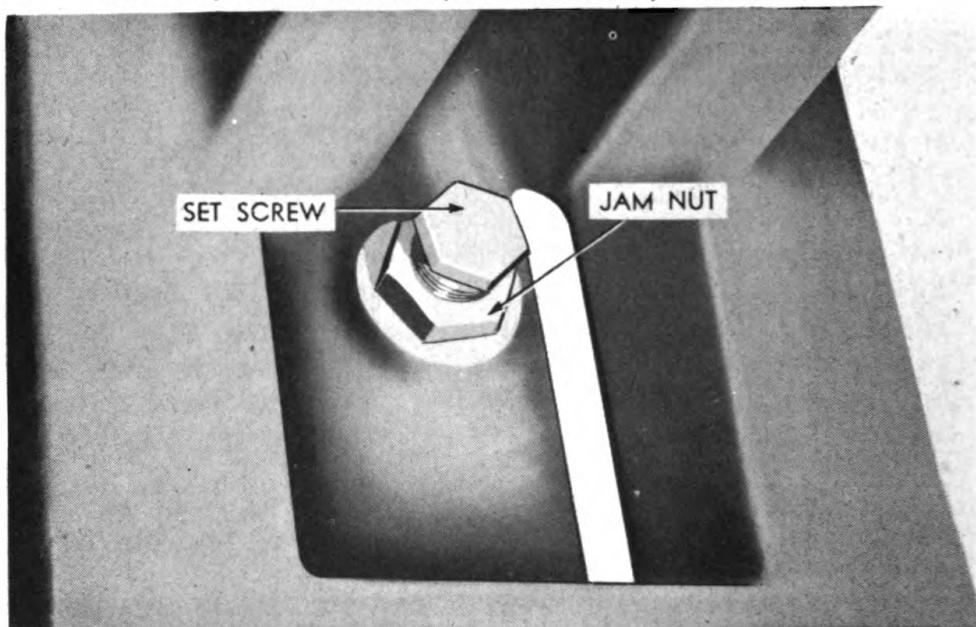
### Section XXIII

## HEAVY CARRIAGE LIMBER M5

### 92. DESCRIPTION (figs. 7 and 8).

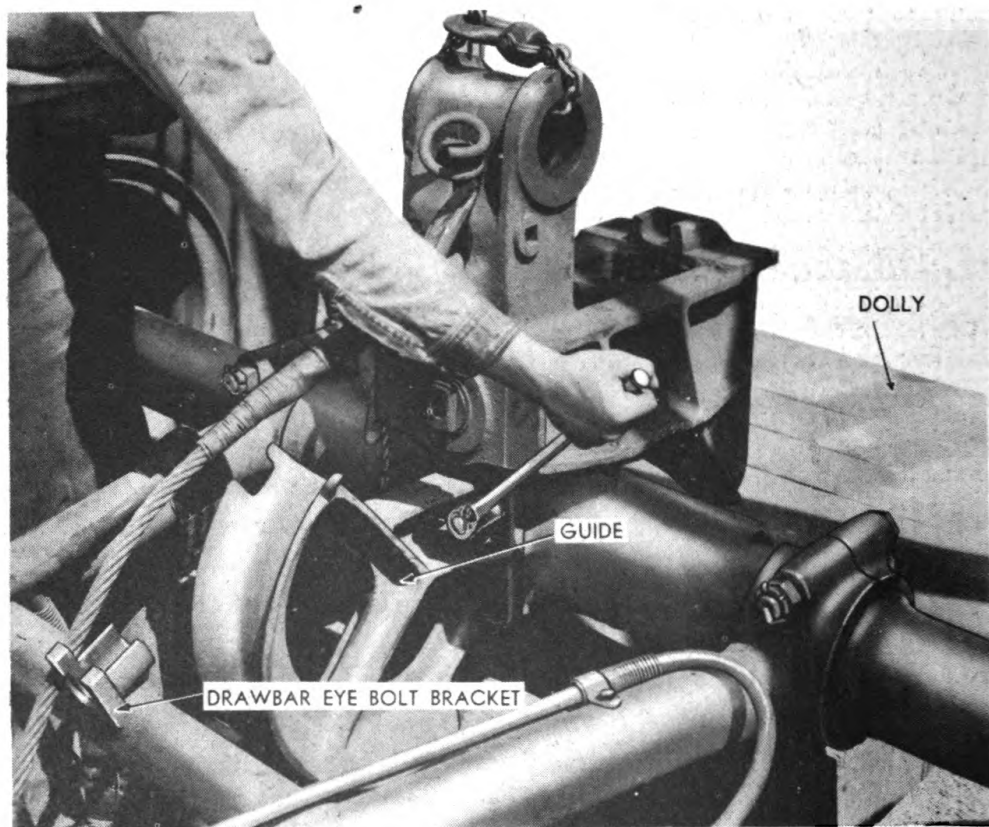
a. The heavy carriage limber M5 is a two-wheeled secondary vehicle the purpose of which is to tow the ammunition trailer, and to support the forward portion of the load. A tubular axle carries a wheel at each end, and is free to rotate in bearings mounted at rear of the tubular drawbar A frame. The towing bracket transmits the towed load to a horizontal rocket pin. By means of a set screw, this pin is locked in a spindle mounted through the center of the axle (fig. 125). An eye bolt pinned to the bracket and secured to the A-frame prevents rotation of the bracket and limber axle. Without the eye bolt in place, the towing bracket is free to rock laterally on the pin and to turn on the spindle, except as it is limited by contact with the axle. The limber is attached to the pintle of the prime mover by means of a spring-loaded lunette housed at the front of the drawbar. The lunette housing, welded between the two drawbar tubes, makes the whole a welded assembly.

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 334916

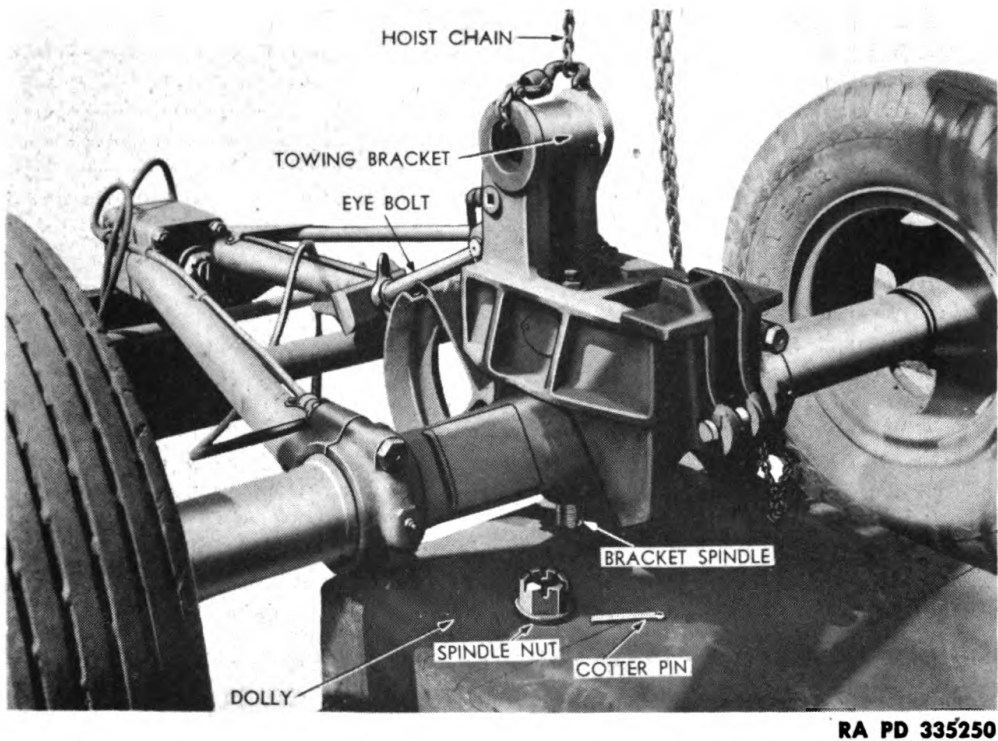
*Figure 125 — Bracket Rocker Pin Set Screw*



RA PD 334940

*Figure 126 — Removing Sling Guide*

## HEAVY CARRIAGE LIMBER M5



RA PD 335250

**Figure 127 — Preparing To Remove Towing Bracket**

### 93. SLING GUIDE.

**a. General.** The sling guide (fig. 126) serves no purpose when the limber is used with the ammunition trailer except to provide a convenient fulcrum against which to use a bar in alining or positioning the towing bracket.

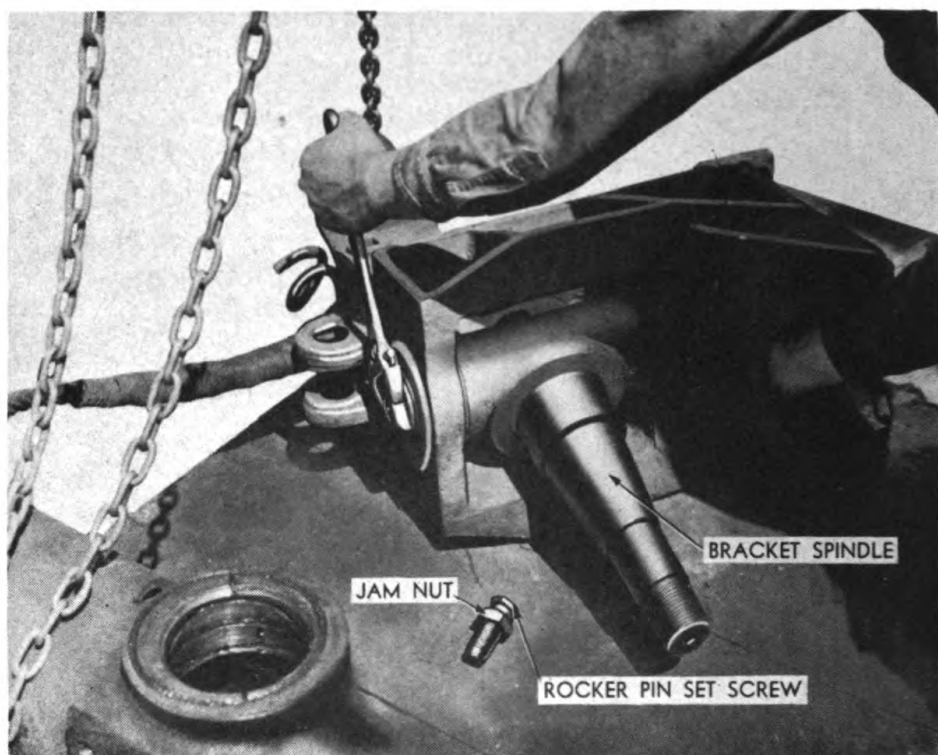
**b. Removal.** Support towing bracket with hoist to prevent axle rotation. Support the sling guide so that its weight will not damage the threads of the mounting cap screws. Remove the four cap screws and lock washers, and remove the guide.

**c. Installation.** With hoist attached to prevent axle rotation, block up guide until mounting holes are alined with holes in axle mounting pad. Install four cap screws and lock washers, and tighten.

### 94. EYE BOLT.

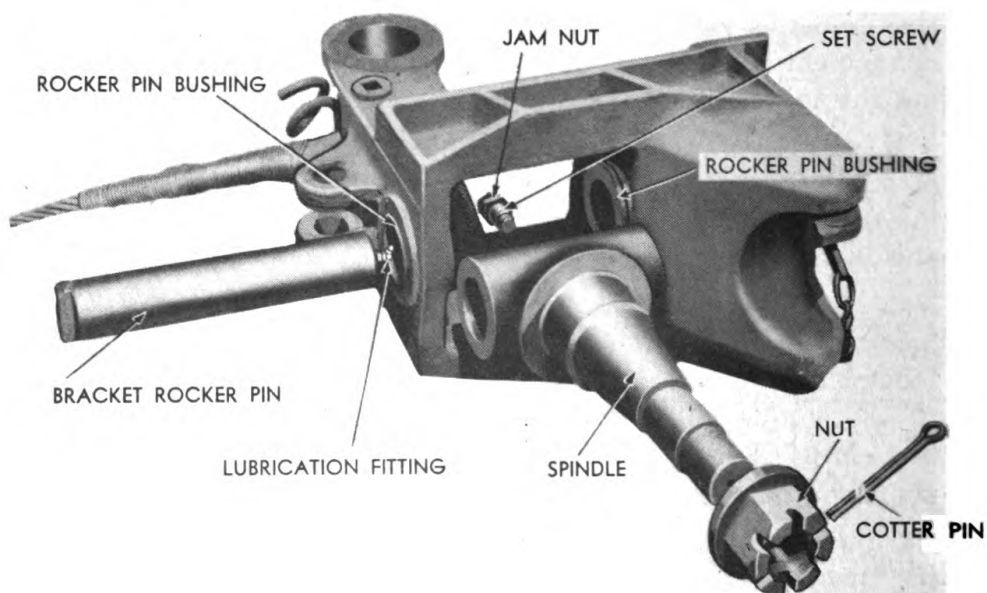
**a. Description.** The eye bolt has three functions. Attached to the limber A-frame and front of towing bracket, it is used to adjust the towing bracket to the desired position for attaching trailer. It prevents axle rotation and rotating, rocking or turning of the towing bracket, when a rigid unit is desired. Attached at the rear of the towing bracket and up through the nose of the trailer, the eye bolt

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RA PD 334998

**Figure 128 — Removing Bracket Rocker Pin**



RA PD 334997

**Figure 129 — Towing Bracket Assembly Sequence**



## HEAVY CARRIAGE LIMBER M5

ties the two mating surfaces together, but permits bracket to rock on rocker pin and turn on spindle.

**b. Removal (With Trailer Attached).** Refer to paragraph 13 b (4).

**c. Installation (With Trailer Attached).** Refer to paragraph 13 e.

**d. Removal (Trailer Detached).** Block limber wheels against rotation in either direction. Place blocks under sling guide and under rear of bracket to prevent axle rotation. Loosen winged adjusting nuts at A-frame bracket (fig. 36). Turn handle of eye bolt locking pin upward (A, fig. 39) to unlocked position. Pull pin straight out and remove eye bolt.

**e. Installation (Trailer Detached).** Block under sling guide and towing bracket as in subparagraph d above. Position eye of eye bolt in towing bracket bosses, and install locking pin all the way in. Turn locking pin handle down to locked position (B, fig. 39). Screw wing nut onto threaded end of bolt with wings of nut toward rear of limber. Screw this nut all the way on. Place alining block over bolt end next to winged nut. Allow threaded end of bolt to rest in bracket in A-frame, and install second nut so that its smaller diameter screws into the mating recess in bracket. Run the first nut down until alining block exerts pressure against bracket. Run nuts forward to lengthen, or rearward to shorten, eye bolt. When correctly adjusted, tighten both nuts.

## 95. TOWING BRACKET (figs. 7, 8 and 127).

### a. Removal.

(1) Block limber wheels to prevent forward or rearward motion, and block up under lunette housing until drawbar A-frame is level.

(2) Remove sling guide (par. 93 b).

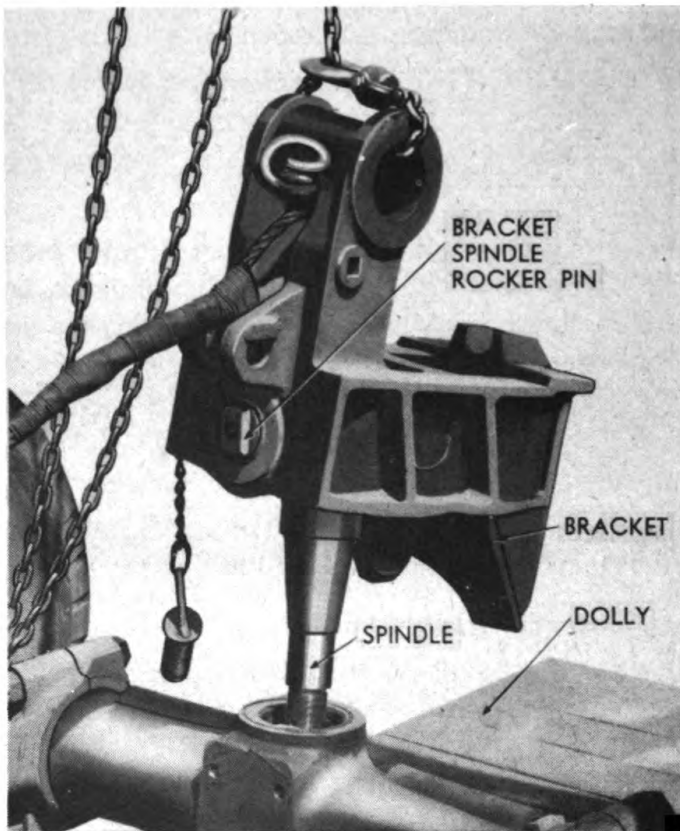
(3) Remove cotter pin and bracket spindle nut from spindle end under axle (fig. 127). Place a wheeled dolly or other support at, or near, the limber to take the bracket when it is removed.

(4) Remove eye bolt (par. 94 d).

(5) Using the hoist, lift the towing bracket and spindle straight up until the threaded spindle end clears the upper spindle bushing. Lay the bracket on its side on the support provided (fig. 128). Disconnect hoist. *NOTE: The sling will not interfere with any maintenance operation. Leave it on the bracket.*

**b. Disassembly.** Loosen jam nut on rocker pin set screw (fig. 125), and remove set screw. Use a wrench on the front end of the rocker pin to turn the pin. With the other hand, reach through the

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RA PD 334926

**Figure 130 — Installing Towing Bracket Assembly**

opening at the rear of the bracket (fig. 128) and contact the rear end of the pin. Start pin out of its bushings by pushing on rear end while it is being turned or oscillated by the wrench at the front. As soon as  $\frac{1}{2}$  inch of pin is exposed, grasp the pin by hand, and pull it straight out of bracket and spindle (fig. 129).

**c. Assembly.**

(1) **CLEANING AND INSPECTION.** Before assembling, carefully clean all parts, and inspect for serviceability. Try rocker pin in bracket bushings. If worn in excess of 0.015 inch, replace the pin. If the new pin appears to be loose beyond the serviceable limit, report to higher authority, or replace the bracket with bushings. Examine the bearing surfaces of the spindle and the mating surfaces of the bushings in the limber axle. Be certain that the lubricant grooves in axle bushings are open and that the bearing surfaces are not cracked or scored. Lubricate spindle and try in bushings for looseness. If wear exists in excess of 0.020 inch, replace the spindle. If still loose, beyond 0.020 inch, report to higher authority, or replace axle with bushings.

## HEAVY CARRIAGE LIMBER M5

(2) **ASSEMBLY.** Lay bracket on its side as shown in figure 128. Aline rocker pin hole in spindle with holes in rocker pin bushings in bracket and support spindle in this position. Insert rear end of rocker pin through front bushing into spindle. Turn rocker pin so that the set screw seat faces the upper surface of the bracket, or 180 degrees away from the threaded end of the spindle. Push rocker pin in until only the flat milled wrench surfaces are exposed. Install set screw loosely. Turn pin slightly in either direction as needed to be sure the set screw is on its seat. When proper alinement is assured, tighten the set screws and install and tighten the jam nut. Use a wire brush to clean spindle threads and threads inside of spindle nut. Where necessary, rework damaged threads by filing.

### d. Installation.

(1) Attach hoist as shown in figure 130. Lift bracket assembly and position over axle with spindle alined with center of lower bushing in axle. Lower the assembly slowly, being careful to guide the spindle so that the bronze bushings will not be damaged. Allow the spindle shoulder to contact the top surface of the upper bushing but do not allow any slack in the hoist lifting chain. Position the eye bolt in the boss at the front of the towing bracket, and install, and lock, the eye bolt locking pin (fig. 39). Secure threaded end of eye bolt in A-frame bracket as directed in paragraph 94 e. Disconnect hoist.

(2) Install spindle nut on spindle, and tighten. Install a new cotter pin and lock properly. Lubricate upper and lower spindle bushings and front and rear rocker pin bushings as instructed in the Lubrication Order (fig. 46).

## 96. WHEELS, HUBS, AND BEARINGS.

**a. Description.** The limber wheels are the pressed-steel ventilated-disk type 20 x 9.10 inch and employ an R-type rim. The wheel fits over a guide ring cast into the hub, and is secured to the hub by ten studs and nuts. The right-hand wheel studs have right-hand threads and the left-hand wheel studs have left-hand threads. The hub rotates on two opposed tapered roller bearings. The outer bearing cone takes the side thrust of the wheel and, secured by the bearing adjusting nut, locking ring, and lock nut, holds the wheel on the axle. The tire equipment is 11.00 x 20 inches and employs the Hiway tread design. Wheels and tires interchange with those used on the ammunition trailer.

### b. Data.

#### (1) WHEELS.

Make ..... Budd  
Type ..... Ventilated-disk

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Rim ..... R-type  
 Number of studs ..... 10  
 Tread ..... 83¼ in.

## (2) TIRES.

Size ..... 11.00 x 20 in.  
 Number of plies ..... 10  
 Air pressure carried ..... 70 lb  
 Tread ..... Hiway

## (3) WHEEL BEARINGS.

Make ..... Timken  
 Type ..... Tapered Roller

## c. Wheel and Tire Assembly.

## (1) REMOVAL.

(a) NOTE: *If prime mover truck is attached to limber, set parking brakes on truck. If limber is attached to both the prime mover and the ammunition trailer, apply the parking brakes on both the truck and the trailer. If the limber is attached to the trailer only, apply the trailer parking brakes. If not attached to either the prime mover or the trailer, rest the front of the limber A-frame on the ground and block in front, and in back, of the serviceable wheel.*

(b) Place jack under limber axle close to wheel, and raise until just enough weight is taken by the wheel to prevent rotation. If one is available, use a hand-impact wrench (fig. 52) and loosen nuts. If a hand-impact wrench is not available, use a socket wrench equipped with a 3-foot extension handle. Leave top and bottom nuts in position (fig. 53) to support wheel, and spin off eight other nuts with a speed wrench. Raise axle with jack until tire can be lifted straight out from hub far enough to be rolled away. Remove lower nut. Have one man support wheel, and remove upper nut. Both men lift wheel straight out off studs, being careful not to damage threads.

## (2) INSTALLATION.

(a) NOTE: *See that vehicle is properly secured against rolling as described in subparagraph (1) (a) above. Raise or lower limber axle until center of hub is approximately ¼-inch above the center of the wheel to be installed.*

(b) Aline hub and wheel so that studs on hub are approximately in line with holes in wheel. Two men lift wheel onto guide ring and over studs. With one man supporting wheel, start upper and lower nuts and run them up to their seats with a speed wrench. Lower axle until wheel cannot be turned. Install eight remaining nuts. Tighten all nuts with impact wrench or use a socket wrench and a 3-foot handle. Lower axle all the way, and remove jack. Inflate tire to 70 pounds.

# HEAVY CARRIAGE LIMBER M5

RA PD 334918

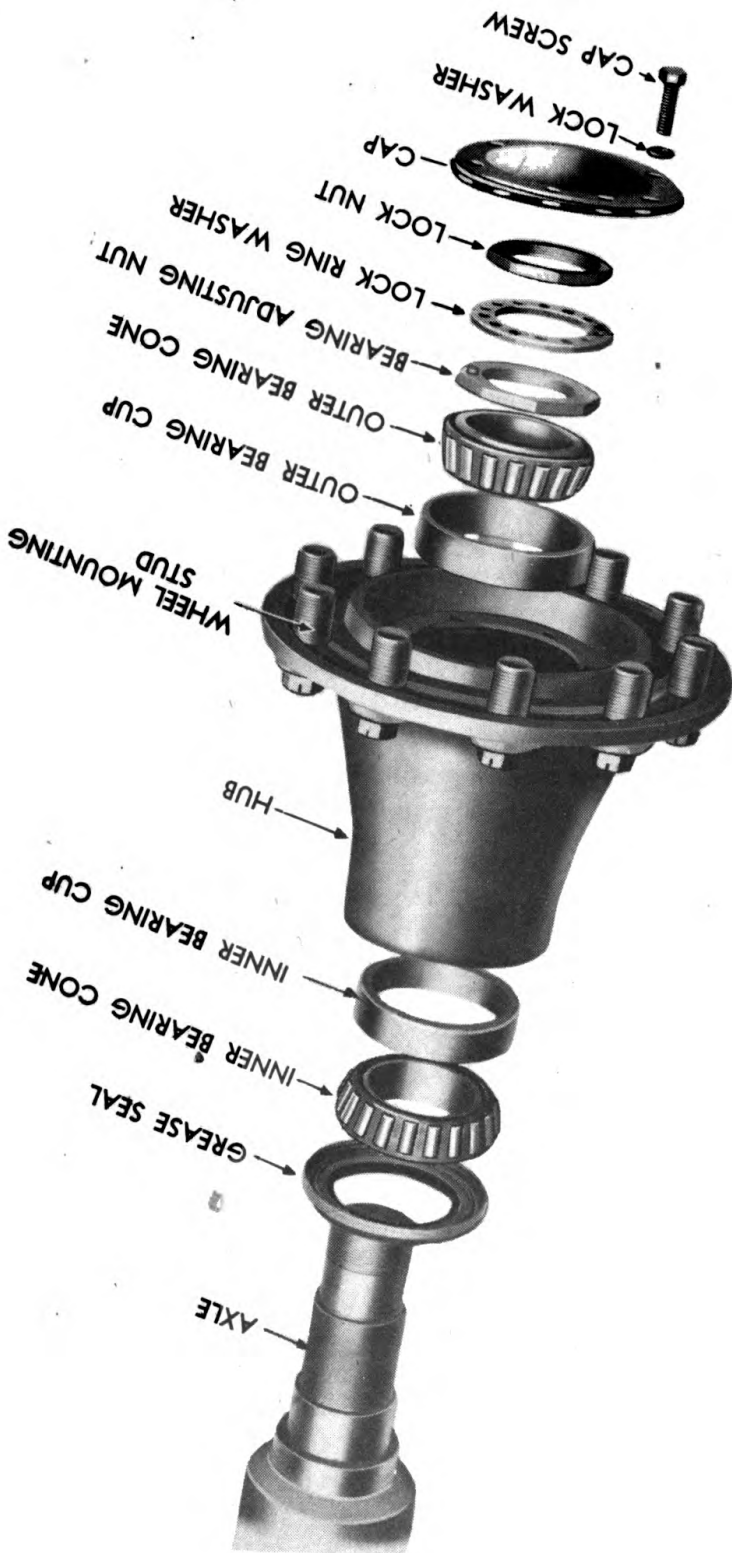


Figure 131 — Limber Hub Disassembled

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## d. Hub and Bearings Assembly.

## (1) REMOVAL.

(a) Remove wheel and tire assembly as described in paragraph c (1) (b) above.

(b) Remove the six cap screws and lock washers securing hub cap to hub, and remove hub cap and gasket (fig. 131). Remove lock nut, wheel bearing adjusting nut lock washer, and adjusting nut. Pull hub out to end of axle; then push back in place leaving outer bearing cone free. Lift cone off axle end and wrap in clean cloth or paper. Remove hub with inner bearing and grease seal in place.

(2) DISASSEMBLY. Use a wood drift through the hub against the inside face of the inner bearing cone and drive out cone and grease seal. Place a brass drift against the inside edge of the bearing cup to be removed. NOTE: *The hub is recessed at two points on the bearing cup seat to take the point of the drift (fig. 54).* Drive alternately on each side of the bearing cup to prevent cocking in the hub bearing bore. Remove cup and store in a clean place.

## (3) ASSEMBLY.

(a) *Clean and Inspect.* Remove bulk of old grease from hub by hand. Wash out balance of grease and clean all inside surfaces of hub thoroughly with dry-cleaning solvent. When dry, examine bores and bearing cup seats. If any roughness or scuffing is evident, replace the hub.

(b) *Install Bearing Cups.* Place hub on wood block or bench. Start bearing cup squarely into bore of hub with the smaller inside diameter of the cup toward the center of the hub. Cover the face of the bearing cup with a piece of hardwood. NOTE: *Use a section of 2- x 6-inch plank, 8 inches long, or a 6-inch section of 2- x 8-inch plank, if either is available.* Drive on hardwood until face of cup is flush with outer edge of hub bore. Use unservicable cup or a piece of hardwood and drive cup in until it bottoms on its seat. Tap soundly all the way around to ensure that cup is squarely against seat at all points. When both cups are installed, wipe all bearing surfaces and center of hub free from any foreign material which may have entered area during installation.

(c) *Install Bearing Cone and Grease Seal.* Clean inner bearing cone with dry-cleaning solvent, and allow to dry. NOTE: *If cone has been used before, be certain that no hardened or caked grease remains lodged between rollers and cage.* Lubricate cone as recommended in paragraph 18 d (1) and set into cup in hub. Start larger outside diameter of grease seal into place in hub. Place hardwood block over face of seal and drive in, until outer face of seal is flush with rim of hub.



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### (4) INSTALLATION.

(a) *Install Hub.* After removing all old grease and dirt from axle end, clean with dry-cleaning solvent. When cleaned surface is dry, slide hub with inner bearing and grease seal into position on axle.

(b) *Install Outer Bearing Cone and Adjusting Nut.* Carefully clean outer bearing cone, dry thoroughly and lubricate (par. 18 d (1)). Slide cone over axle end and into outer bearing cup. Screw adjusting nut up only tightly enough to support outer bearing cone. Install wheel and tire assembly (par. 96 c (2)). Leave axle jacked up until bearings are adjusted.

(c) *Adjust bearings.* Refer to paragraph 97.

### 97. BEARING ADJUSTMENT.

a. *Preliminary Inspection (Vehicle in Service).* Jack up axle until wheel is free to turn. Remove hub cap, lock nut, and adjusting nut lock washer. Using a pry bar under tire, lift wheel assembly and note the amount of lash existing between the outer bearing cone and the cup. If loose in excess of  $\frac{1}{32}$  inch, disassemble the hub and inspect bearings.

b. *Adjustment.* Use the wheel bearing adjusting nut wrench and turn adjusting nut until tight to ensure that the oil seal is against the axle shoulder. Back nut off until wheel is free, or about one half turn. Inspect for lash as described in a above. When adjustment is correct, slide lock washer onto axle. If none of the perforations in the washer line up with the dowel in the adjusting nut, reverse the ring. If still not alined, apply that side of the washer toward the nut which will require the least movement of the nut to mate the two parts. Install the lock nut and tighten.

c. *Install Hub Cap.* Carefully clean hub cap and mounting surfaces. Install hub cap and gasket and secure with six cap screws and lock washers. Lower limber axle and remove jack. **NOTE:** *Bearings are adjustable for wear.* For satisfactory operation and long life, they must be correctly adjusted and lubricated as recommended in the Lubrication Order (par. 18).

### 98. LUNETTE.

a. *Disassembly.* Remove two cap screws and lock washers securing brake air hose clamps to lunette housing, and pull air hose brackets and air hoses away from housing to prevent damage to hoses (fig. 132). Remove cotter pin securing lunette nut, and remove nut. Pull lunette shaft forward and out of housing. Remove four nuts and lock washers from housing cover bolts, and remove bolts. Use hammer and brass drift and drive off cover with front spacer bushing. Remove spring and rear spacer bushing.

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

RA PD 339739

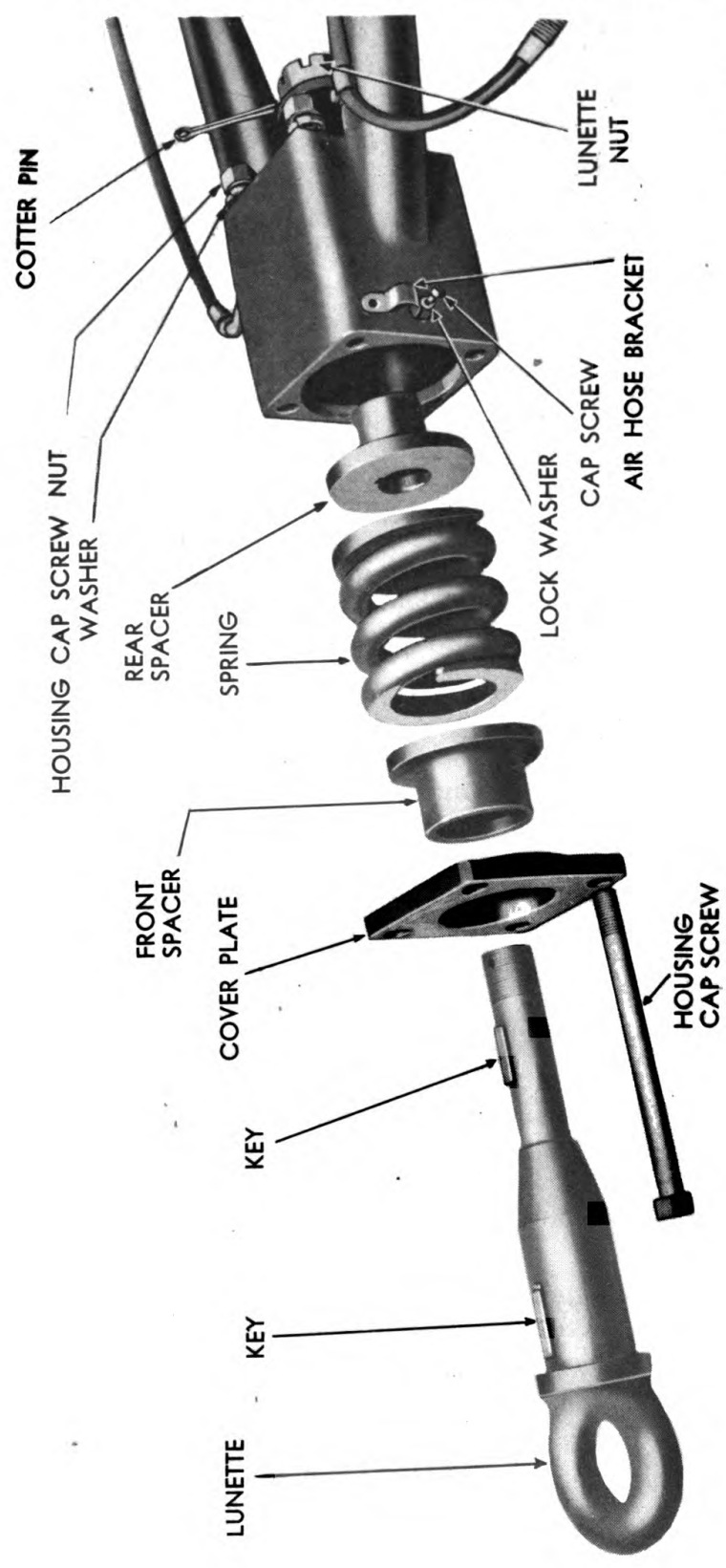


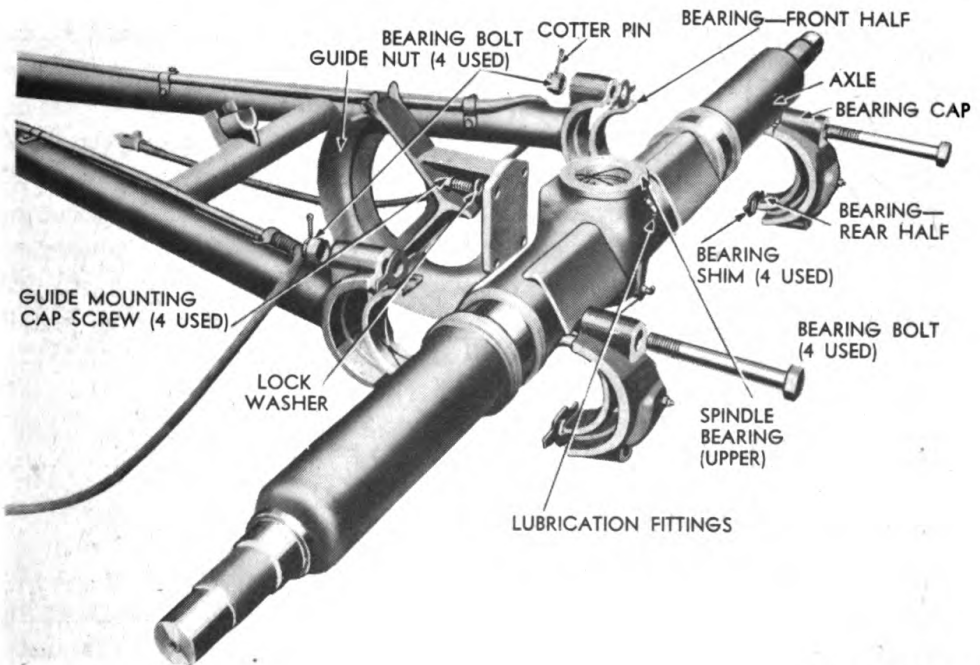
Figure 132 — Lunette Disassembled

# HEAVY CARRIAGE LIMBER M5



RA PD 334999

**Figure 133 — Drawbar Supported for Drawbar or Axle Removal**



RA PD 335248

**Figure 134 — Drawbar and Axle Assembly Sequence**

## TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

b. **Assembly.** Place rear spacer bushing in housing and insert smaller end into hole at rear of housing with keyway at top. Place spring in housing against front of rear spacer bushing. Insert smaller diameter of front spacer bushing into front cover, from rear or inside of cover, with keyway at top of bushing. Align cap screw holes in cover with holes in housing and tap cover into place noting that the keyway, in the bushing, is upward as it was when placed in cover. Install the four cap screws, and secure with lock washers and nuts. See that keyways in bushings are aligned, and install lunette. Install nut, tighten, and secure with cotter pin. Install brake hoses and brackets with brackets clamping the ferrule at the rear of the spring guard.

## 99. AIRLINES AND BRACKETS.

a. **Maintenance.** When possible, replace the air hoses on the limber as complete assemblies. In an emergency, repair as directed in paragraph 54 d through f.

b. **Removal and Installation.** Remove brackets clamping hose to A-frame and hose spring guards (fig. 132) and remove hose assembly. When installing a hose assembly, place hose on A-frame and install brackets loosely. See that connecting ends of hose being installed extend forward and rearward the correct distance, and tighten brackets. **NOTE:** *Be sure spring guide ferrules are under brackets before tightening.*

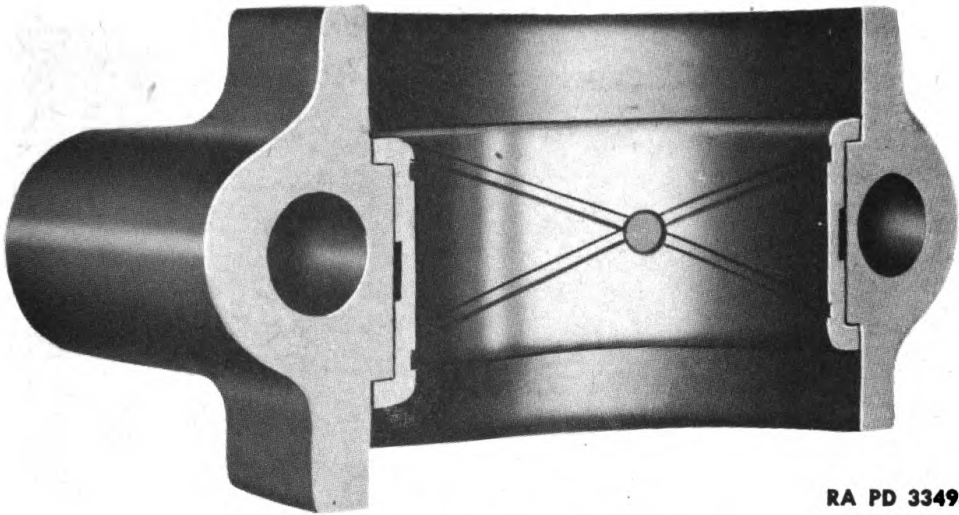
## 100. DRAWBAR, AXLE AND BEARINGS.

a. **General.** The tubular limber A-frame is secured to the axle in such a manner that the replacement of either major part or the drawbar axle bearings entails substantially the same disassembly procedure. The major exception is the removal of towing bracket and sling guide in the case of drawbar or drawbar bearing replacement. While this removal is not necessary, it is recommended both as a safety factor, and to make possible the inspection of towing bracket spindle and the spindle bushings in the axle.

### b. Disassembly.

- (1) **REMOVE SLING GUIDE.** Refer to paragraph 93 b.
- (2) **REMOVE EYE BOLT.** Refer to paragraph 94 d.
- (3) **REMOVE TOWING BRACKET.** Refer to paragraph 95 a.
- (4) **SEPARATE AXLE AND DRAWBAR.** Support drawbar as illustrated in figure 133. Remove cotter pins from the four bearing bolt nuts and remove nuts. Support bearing cap and tap bolts out of bearing and remove bearing caps and shims. Roll wheels and axle rearward away from drawbar. **NOTE:** *If axle is not being replaced,*

# HEAVY CARRIAGE LIMBER M5



RA PD 334936

**Figure 135 — Drawbar Bearing Cap**

*omit subparagraphs (5) and (6) below. Slide bronze bearing inserts out of drawbar ends and bearing caps.*

(5) REMOVE WHEEL AND TIRE ASSEMBLIES. Refer to paragraph 96 c (1).

(6) REMOVE HUB AND BEARINGS ASSEMBLIES. Refer to paragraph 96 d (1).

**c. Cleaning and Inspection.** Clean all bearing surfaces with dry-cleaning solvent. If hubs were removed, clean bearings as recommended in paragraph 18 d (1). Be sure all lubricant grooves and channels are clean (figs. 135 and 136). Remove lubrication fitting and clean out hole in bearing cap. Inspect bronze inserts for cracks or scoring.

## **d. Assembly.**

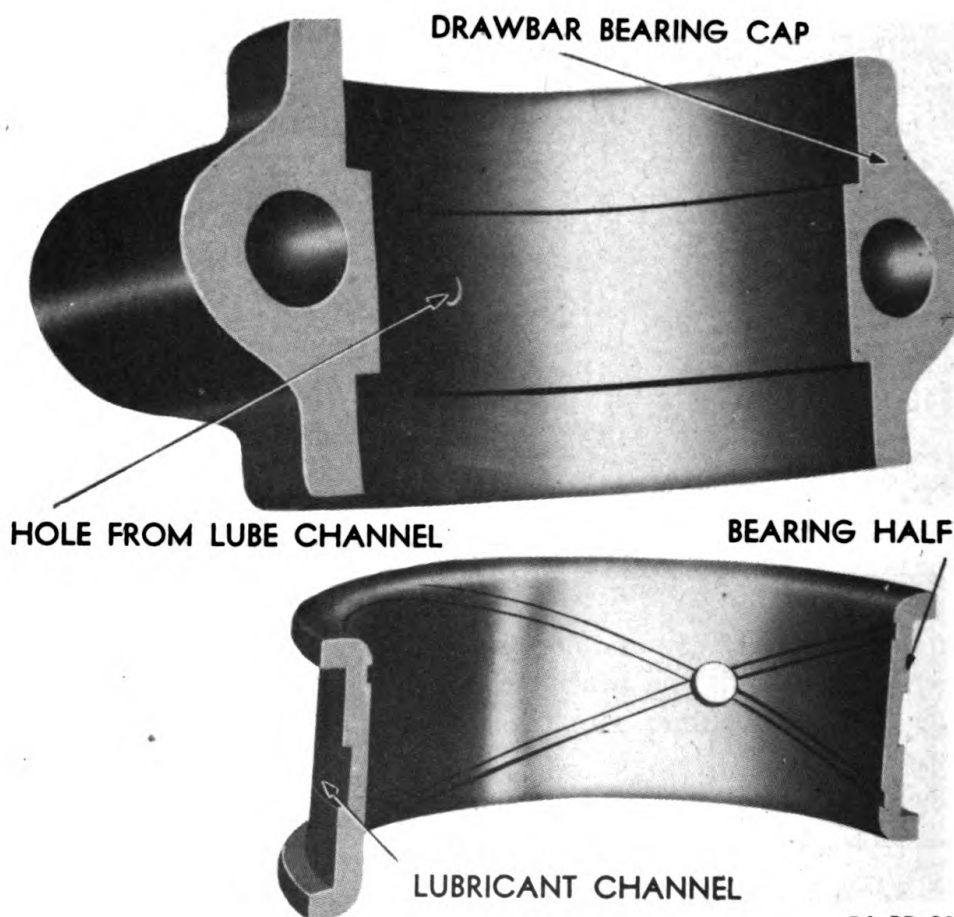
(1) NOTE: *If wheels and hubs were not removed, omit subparagraphs (2) and (3) below.*

(2) INSTALL HUBS AND BEARINGS. Refer to paragraph 96 d (3).

(3) INSTALL WHEELS AND TIRES. Refer to paragraph 96 c (2).

(4) CONNECT AXLE AND DRAWBAR. Slide bronze inserts into drawbar ends. Carefully aline axle and wheels assembly and roll axle forward into drawbar ends. Be sure bronze inserts are properly mated with the mating recesses in the axle (fig. 134). Position bearing cap, with insert in place, so that bolt holes are alined, and insert and aline a shim between the bearing halves. Insert bolt through holes in cap, shim, and drawbar end, and install nut loosely. Position second shim, and install second bolt. Tap lightly on bearing cap to

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 334935

**Figure 136 – Drawbar Bearing Cap Disassembled**

assure that inserts and shims are correctly placed. Tighten bearing bolt nuts and secure with cotter pins. Assemble second bearing in the same manner.

- (5) INSTALL TOWING BRACKET. Refer to paragraph 95 d.
- (6) INSTALL SLING GUIDE. Refer to paragraph 93 c.
- (7) INSTALL EYE BOLT. Refer to paragraph 94 e.



## PART FOUR — ORDNANCE MAINTENANCE INSTRUCTIONS

### Section XXIV

### SLACK ADJUSTER

#### 101. DESCRIPTION AND DATA.

a. **Description.** Slack adjusters function as adjustable levers, and provide a quick and easy means of adjusting the brakes to compensate for brake lining wear. They consist of a worm and gear enclosed in a body which also serves as a lever. The ammunition trailer employs a type-K slack adjuster at each of the brake camshafts. During brake operation, the entire slack adjuster rotates with the brake cam shaft. During brake adjustments, turning the worm rotates the lever about the worm changing the position of the lever arm in relation to the brake cam shaft (fig. 61).

#### b. Data.

Make ..... Bendix-Westinghouse  
Type ..... K  
Splines ..... SAE 10C  
Stock number ..... 0850-220269

#### 102. DISASSEMBLY.

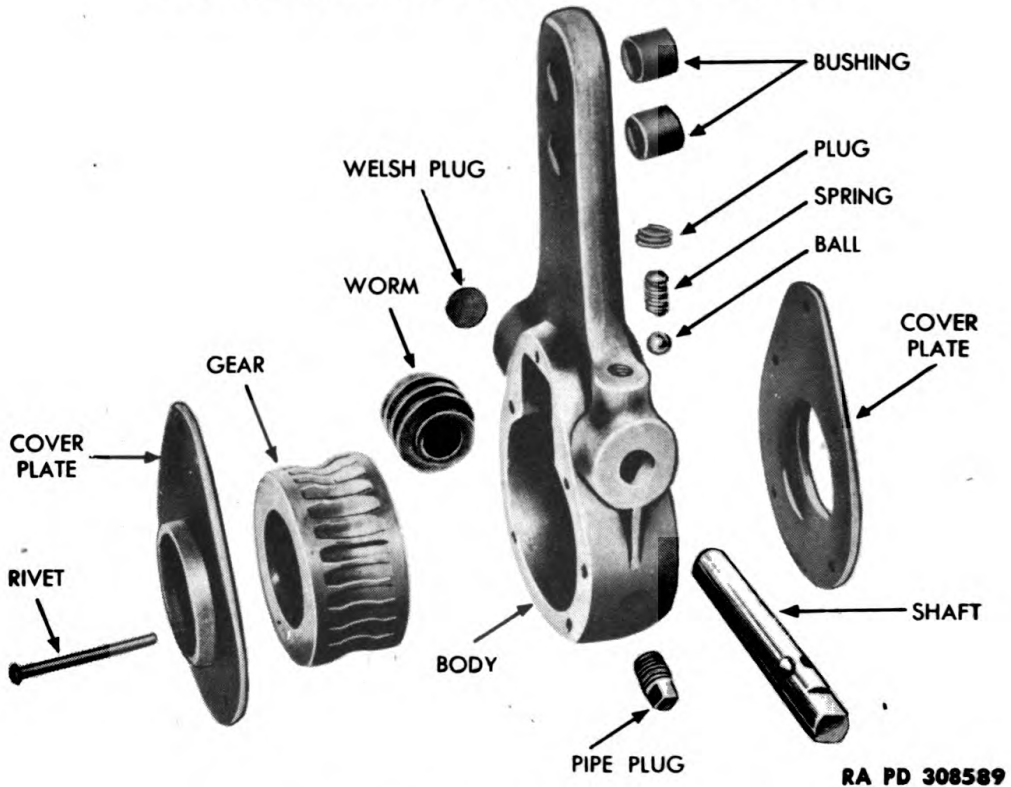
a. **Cleaning and Inspection.** Remove all dirt and grease from exterior of slack adjuster, using dry-cleaning solvent. Inspect for broken or damaged parts. All broken or damaged parts must be replaced.

b. **Disassembly** (fig. 137). Using a cold chisel, cut off riveted ends of five rivets securing covers in place. Drive out rivets and remove covers. Remove lock lug, lock spring, and lock plunger. Remove welsh plug. Insert a punch through the welsh plug opening, and drive out worm shaft. Remove worm and gear. If the arm bushings need replacing, drive or press out. Remove grease plug.

#### 103. CLEANING, INSPECTION AND REPAIRS.

a. Clean all parts using dry-cleaning solvent. Inspect worm and gear, and replace if worn, or if they have any broken or damaged teeth. Inspect worm shaft for damage or wear, particularly the condition of the indents engaged by the lock plunger. All side walls of indents must be in good condition, otherwise worm shaft must be replaced. Inspect condition of bushings in the arm. If worn oblong or if they have been damaged, they must be replaced.

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



**Figure 137 — Slack Adjuster Disassembled**

**104. ASSEMBLY.**

a. If bushings in arm have been removed, press new bushings into place. Ream bushings to 0.501 inch minimum, 0.503 inch maximum, after pressing into place.

b. Place worm and gear in position in body. Enter small end of worm shaft through hole in body from the end nearest the lock. Position small end of worm shaft in bore of worm, and drive or press shaft into place until indents in shaft line up with bore of spring lock.

c. Using new rivets, rivet covers in place. Covers must be flat, and make good contact with the body.

d. Install welsh plug in open end of worm shaft bore.

e. Install lock plunger, lock spring, and lock spring plug, being sure lock plunger will properly engage the indents in the worm shaft as the worm shaft is turned. Tighten lock spring plug as much as possible without locking worm shaft from turning. Turn worm shaft while tightening lock spring plug to determine the correct adjustment. Do not tighten the lock spring plug too much or the lock spring will be compressed to its solid height, preventing the lock plunger from rising out of the indents. If the worm shaft is turned under these

## BRAKE AIR CHAMBER

conditions, the worm shaft or plunger or both will be damaged. When correct adjustment is obtained, prick punch the lock spring plug to prevent its getting out of adjustment.

- f. Lubricate slack adjuster (par. 18).

### 105. TEST OF REBUILT SLACK ADJUSTER.

a. Turn adjusting nut and worm until the gear makes one complete revolution. There must be no evidence of binding. Check for backlash between worm and gear. There must be very little backlash.

---

## Section XXV

## BRAKE AIR CHAMBER

### 106. DESCRIPTION AND DATA.

a. **Description.** Brake air chambers are employed to convert the energy of compressed air into the mechanical force and motion necessary to operate the brakes. As air pressure enters the brake air chamber behind the diaphragm (fig. 138), the diaphragm pushes the push rod outward, thus rotating the slack adjuster, brake camshaft and brake cam, applying the brakes. As the air pressure increases in the brake chamber, the force available for brake application increases. Lower the air pressure and the retarding force is lowered. When pressure is released from the air chamber, the brake shoe return springs and the air chamber springs return the brake shoes, brake cam, slack adjuster, brake chamber push rod and diaphragm to released position.

#### b. Data.

##### (1) AIR CHAMBER.

|                    |                     |
|--------------------|---------------------|
| Make .....         | Bendix-Westinghouse |
| Type .....         | Stud                |
| Stock number ..... | 0850-216218         |

##### (2) REPAIR KIT.

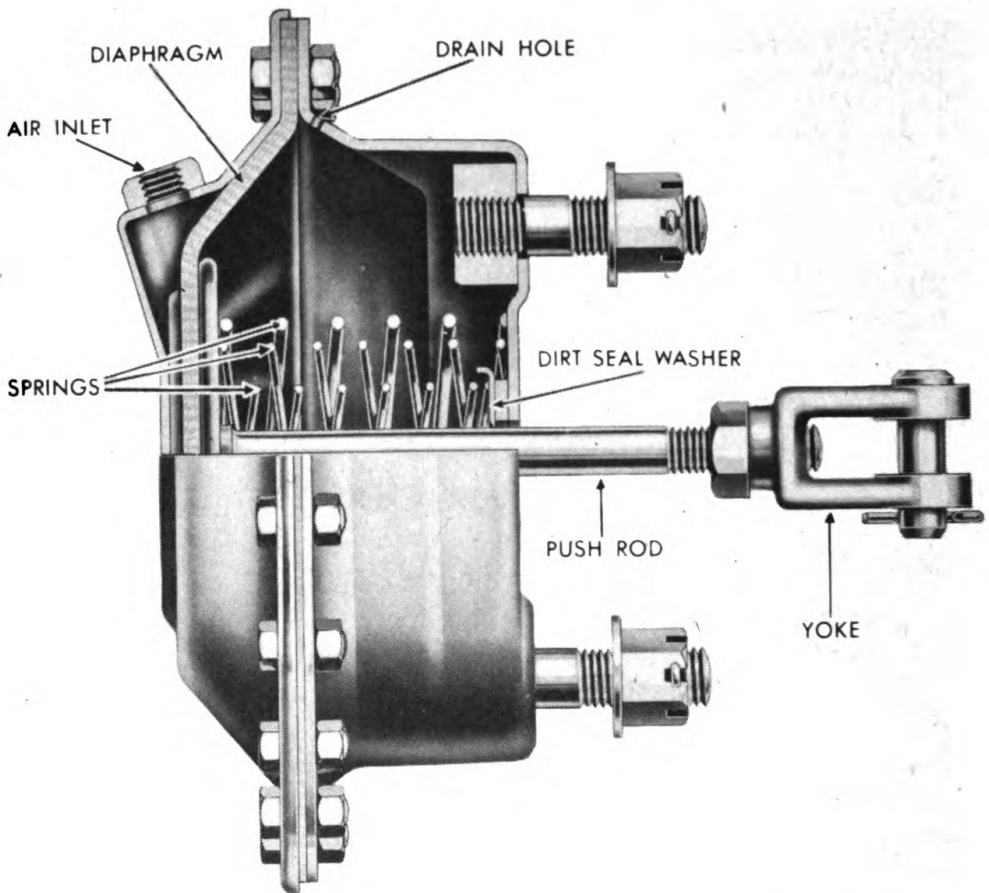
|                    |             |
|--------------------|-------------|
| Stock number ..... | 0850-221498 |
|--------------------|-------------|

### 107. DISASSEMBLY.

a. **Cleaning and Inspection.** Remove all dirt and grease from exterior of brake chamber, using dry-cleaning solvent and a brush. Inspect for broken or damaged parts. All broken or damaged parts must be replaced.

b. **Disassembly** (fig. 139). Before disassembling the brake chamber, be sure to mark the pressure plate and nonpressure plate so that

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 308693

**Figure 138 — Air Chamber Sectionalized**

the air inlet opening in the pressure plate will be at the correct angle with the mounting bolt or bracket when the brake chamber is re-assembled. Remove all bolts and nuts clamping the outer edges of the diaphragm between the pressure plate and nonpressure plate. Remove pressure plate and diaphragm. Loosen lock nut locking yoke in position on push rod, and remove yoke from push rod.

**108. CLEANING, INSPECTION, AND REPAIRS.**

a. Clean all metal parts thoroughly using dry-cleaning solvent, and inspect them for damage. Replace all damaged parts. Inspect rubber diaphragm for signs of checking or wear. Replace if any signs of wear or damage are found. **CAUTION:** *When replacing springs in brake chambers be sure the correct type of spring is used, otherwise unbalanced braking may result.*

# BRAKE AIR CHAMBER

RA PD 308605

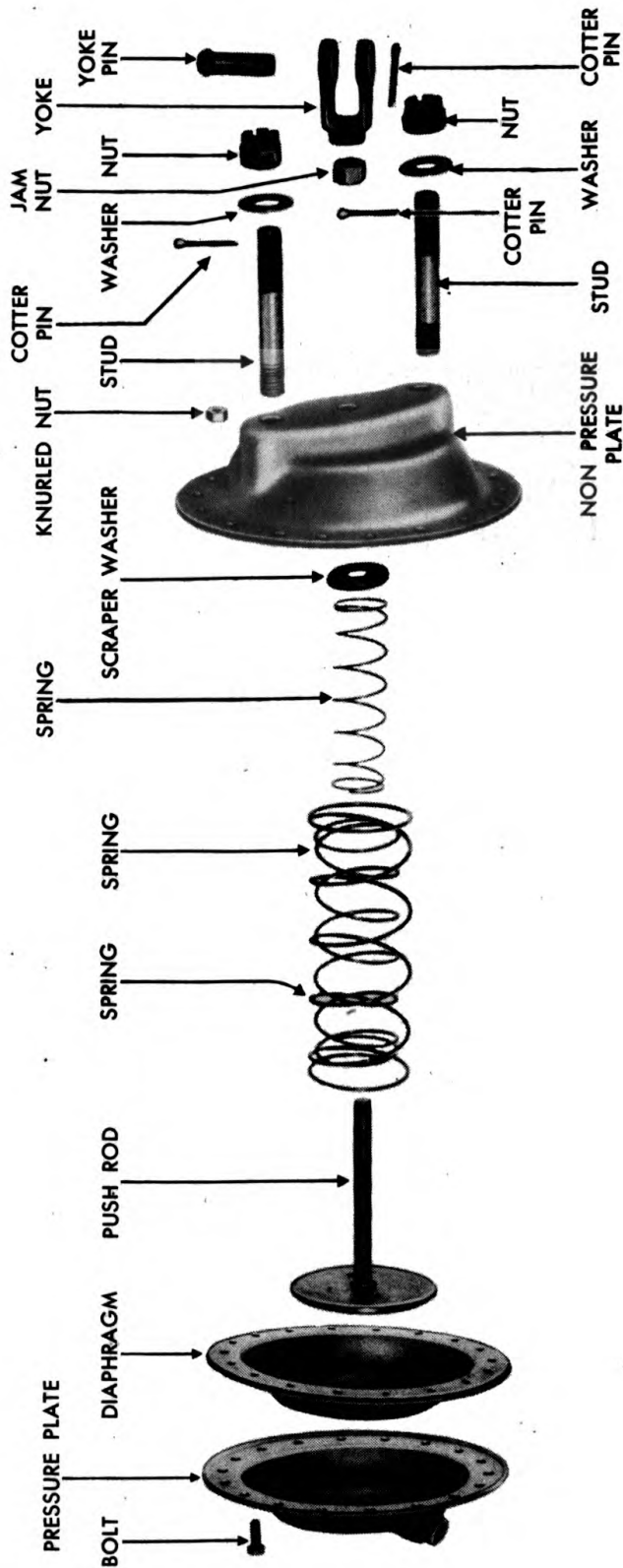


Figure 139 — Air Chamber Disassembled

**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)**

**109. ASSEMBLY.**

a. Position push rod, springs, and dirt seal washer, if one is used in place in the nonpressure plate, and install yoke and yoke lock nut. Position diaphragm and pressure plate, being sure the air inlet opening in the pressure plate is in proper relation to the mounting bolt or mounting bracket as marked before disassembly. Install nuts and bolts holding diaphragm between the pressure plate and the non-pressure plate. It is important that all bolts be tightened evenly and not excessively. Tighten the nuts only sufficiently to ensure an air tight seal between the pressure plate and the diaphragm, and not sufficiently to distort the diaphragm.

---

**Section XXVI**

**BRAKE SHOES AND DRUMS**

**110. DESCRIPTION AND DATA.**

a. **Description.** The brake shoes are heavy duty machined castings. Two formed brake blocks, bolted to the shoe, provide the friction surface between the shoe and the drum. A wear plate at the toe of the shoe bears on the operating cam, and is replaceable when worn, beyond the serviceable limit. Two bronze or special formula steel bushings in the heel of the shoe hinge turn on a fixed anchor pin when the brake shoe is activated by the S-type cam. A pin, near the toe of each shoe, anchors two springs which connect the upper and lower shoes, and return the shoes to their neutral position when the brakes are released.

**b. Data.**

**(1) BRAKE SHOES.**

Make ..... **Timken**

Stockage number:

Lower shoe with linings ..... **8500-A30-3222-B-210**

Upper shoe with linings ..... **8500-A29-3222-B-210**

**(2) BRAKE SHOE BUSHING.**

Federal stockage number ..... **G509-01-29087**

**(3) BRAKE DRUM.**

Size ..... **17¼ in.**

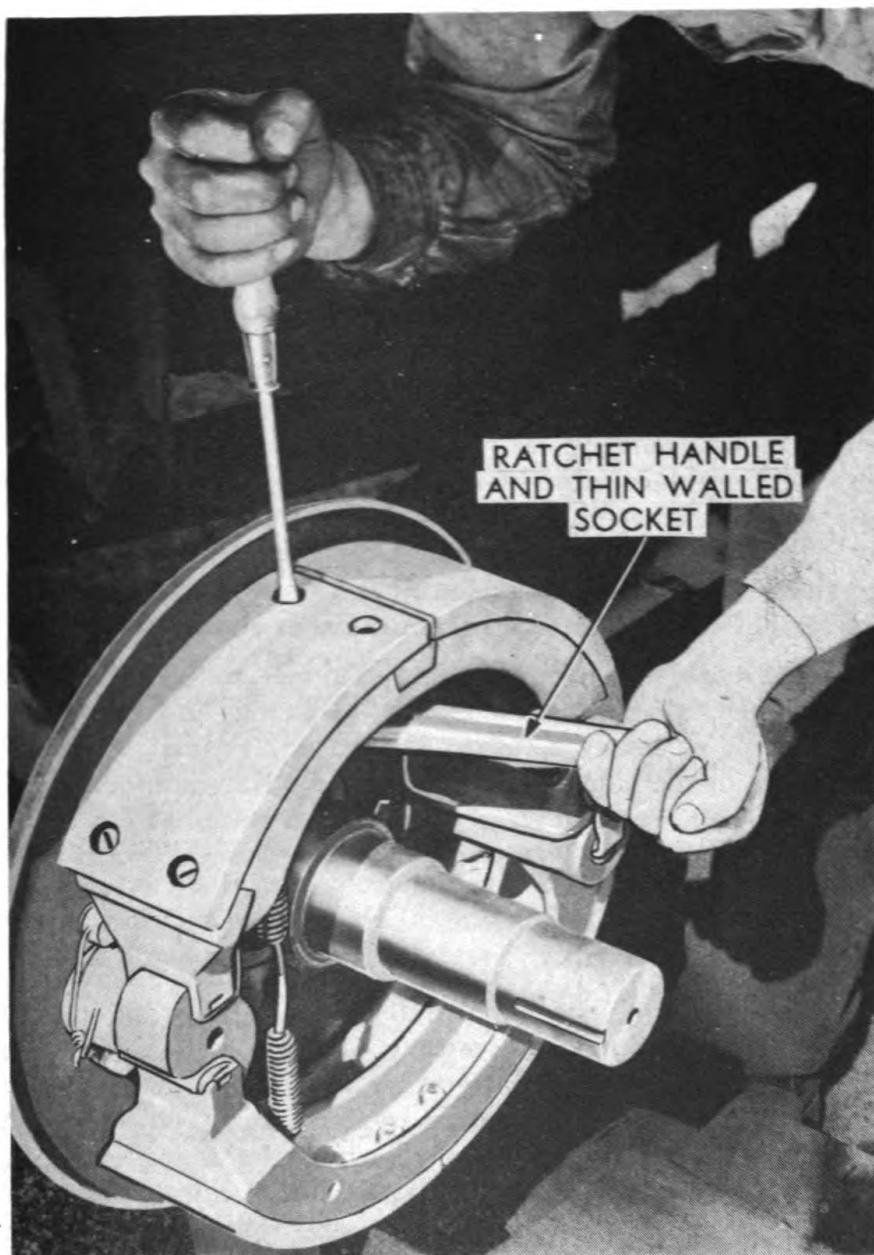
Stock number ..... **8500-3219-E-863**

**(4) BRAKE LINING KIT.**

Stock number ..... **8500-M.P.S.-282**



**BRAKE SHOES AND DRUMS**



RA PD 335247

**Figure 140 — Removing Brake Linings Shoes in Place**

**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)**

**111. LINING REPLACEMENT ON VEHICLE (WHEELS REMOVED).**

a. **General.** In an emergency, brake shoes, which do not require removal for other maintenance, may be relined without removing the shoes from the vehicle.

b. **Lining Removal.** Use a screwdriver to hold bolt heads and a thin-walled socket with a 2-inch extension and a ratchet handle on the brake lining bolt nuts. Remove the four bolts, nuts, and lock washers securing each block of lining, and remove lining.

c. **Lining Installation.** Set lining block in place, and install bolts. Install lock washers and start nuts onto bolts with fingers. Use screwdriver to hold bolt heads, and tighten nuts with thin walled socket used in subparagraph b above.

**112. DISASSEMBLY.**

a. **Inspection.** Clean cam wear plate and bushings in heel of shoe with dry-cleaning solvent. If face of wear plate shows wear of 0.015 inch or more, replace wear plate. If bushings are worn in excess of 0.015 inch, they must be replaced. Replace brake linings which are badly scored or when worn to within  $\frac{1}{32}$  inch of the heads of the brake lining bolts. Always replace oil or grease-soaked linings. Check return spring for looseness, and replace pin or shoe as need indicates.

b. **Disassembly.** With shoe secured in vise, remove the four bolts, nuts and washers securing each block of lining, and remove lining. Use a pry bar or heavy screwdriver and pry return spring pin out through hole in the side of the brake shoe. Remove wear plate retaining screw, and remove wear plate. Press bushings out of heel of shoe.

**113. ASSEMBLY.**

a. **Install Bushings.** Press one bushing in until flush with outer side of shoe. Reverse shoe, and install the second bushing in the same manner. Ream bushings, if necessary, to 1.255 inch inside diameter. Drive new return spring pin into center web of shoe until centered in the web. Install wear plate, and set retaining screw up tightly. Make sure that the surface of the shoe, to which the lining is applied, is clean and not rough or burred. Apply linings noting that the two linings are properly alined on the shoe, and that lining ends at heel and toe are properly beveled.

**114. BRAKE DRUMS.**

a. **Reconditioning Unserviceable Drums.** Brake drums have an original inside diameter of 17 $\frac{1}{4}$  inches. Repair scored or out-of-

## CENTER CROSS AXLE AND WALKING BEAM

round drums by turning the drum in any lathe which will handle the metal in the drum without chatter. The maximum inside diameter after machining must be held to  $17\frac{3}{8}$  inches. **NOTE:** *In order to assure the concentricity of the inside circumference of the drum with regard to the bearing center in the hub, always mount the drum on the hub with which it is to be used before machining.*

b. **New Drums.** After mounting a new drum, always take a light cut across the contacting surface to assure that the braking surface in the new drum will be concentric with the bearing centers in the hub.

### Section XXVII

## CENTER CROSS AXLE AND WALKING BEAM

### 115. DESCRIPTION AND DATA.

#### a. Description.

(1) **CENTER CROSS AXLE.** The center cross axle, or main axle, is a rectangular section of tempered steel. The axle ends are tapered and machined to provide the bearing surfaces which ride in the walking beam bushings (fig. 103). The inner, or flanged, bushing is a steel casting which is welded to the axle and later machined to size. A sleeve, pressed onto the outer machined surface of the spindle, rides in the outer bushing in the walking beam. The vehicle load, transmitted through the springs to the axle, is supported by these machined surfaces on the axle spindles and the mating surfaces in their respective walking beams.

(2) **WALKING BEAM.** The walking beam is a structure of heavy steel plates and castings welded into a load-carrying frame unit. Its all-welded construction renders impracticable any maintenance by mobile units other than the replacement of the stub axles or the two bushings in the walking beam hub. The walking beam is further described in paragraph 56 a.

#### b. Data.

##### (1) CENTER CROSS AXLE.

|                    |                    |
|--------------------|--------------------|
| Make .....         | Utility            |
| Camber .....       | $1\frac{1}{2}$ deg |
| Stock number ..... | 9120-43A-36        |

##### (2) WALKING BEAM WITH STUB AXLES, AXLE NUTS AND BUSHINGS.

|                                |              |
|--------------------------------|--------------|
| Stock number (left-hand) ..... | G216-7014916 |
| (right-hand) .....             | G216-7014917 |

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

(3) STUB AXLE.

Make ..... Timken  
Stock number ..... 0120-44A-250

116. AXLE CAMBER.

a. Use an axle gage and check the axle for bend. If not bent, apply the camber gage and measure the angle from the inside flange to the spindle end. The correct setting is  $1\frac{1}{2}$  degrees of positive camber. Bend as needed to obtain proper camber. **NOTE:** *Do not attempt a camber measurement or repair on a bent axle. Straighten the axle first.*

117. AXLE INNER BUSHING AND SLEEVE (fig. 103).

a. **Inspection.** Carefully check the outside diameter of the sleeve and note whether or not the sleeve is loose on the spindle. The sleeve has a new outside diameter of 2.865 inches. If the sleeve is tight on the axle but shows wear in excess of 0.015 inch, replace the sleeve. If the sleeve is loose and has been turning on the axle spindle, replace the axle. The inner or larger bearing surface has a new outside diameter of 5.000 inches. If this surface is smooth and not worn in excess of 0.025 inch, it is serviceable. If it measures less than 4.975 inches at any point, replace the axle.

b. **Sleeve Removal and Installation.** Drive old sleeve off spindle end. Aline new sleeve and start onto spindle. Using the old sleeve against the new, drive the new sleeve onto the spindle until the outer edge of the new sleeve is just inside, or beyond, the threaded portion of the spindle end.

118. WALKING BEAM BUSHING REMOVAL.

a. **Inspection.** Thoroughly clean the inside of the hub and bushings with dry-cleaning solvent. Examine bushings carefully. If they are rough, grooved, or loose in the hub, they must be replaced. The larger bushing has a new inside diameter of 5.010 inches. Replace the bushing if inside diameter measures more than 5.025 inches. The outer bushing has a new inside diameter of 2.873 inches. Replace the bushing if this measurement is more than 2.888 inches. **NOTE:** *Always measure both bushings at several points around the inner circumference, to detect elongation or a bearing surface worn egg-shaped.*

b. **Removal.** The removal of walking beam bushings is described in paragraph 62. The procedure here is the same except that where a drift was used by the using arm a press will be employed by ordnance maintenance personnel.

c. **Installation.** Install bushings as in paragraph 63 except that a press should be used, if available.



**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)**

**119. STUB AXLES.**

a. Stub axle removal and installation is covered in paragraph 57. If available, use a press to loosen the axle in the walking beam. Figure 141 illustrates the parts and assemblies which must be removed if the axle is pressed out. If the axle is driven out as in figure 100, it is not necessary to remove the dust shield assembly, the slack adjuster, or the brake air chamber.

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**Section XXVIII**

**LANDING GEAR**

**120. DESCRIPTION AND DATA.**

a. **Description.** The trailer landing gear is composed of two upper or vertical leg assemblies, one right-hand and one left-hand, two lower leg assemblies and a dolly. The tubular dolly axle hinges in tubes welded into circular recesses at the bottom of each of the two lower legs. The two cranks have a common crankshaft, and either, or both, may be used to lower, or retract, the twin assemblies.

**b. Data.**

Make ..... Bantam

Stock numbers:

Upper leg assembly..... 9120-44A-510

Lower leg assembly..... 9120-44A-512

**121. DISASSEMBLY (fig. 142).**

a. **Remove Bevel Gear and Shaft.** Remove three cap screws and lock washers from bevel gear cover, and remove the cover and cover gasket. Remove two bolts, nuts, and lock washers from crankshaft coupling (O), and remove the coupling. Place a  $\frac{3}{8}$ -inch drift punch in the bolt hole of the bevel gear shaft, and turn the bevel gear shaft until stop is reached and the wheels are in the retracted position. Drive the bevel gear shaft (F) partly out of frame bracket or until Woodruff key is exposed. Remove Woodruff key, and pull out the bevel gear shaft, and lift the bevel gear (AU) out of the frame bracket.

b. **Remove Lower Leg.** Remove cap screw (AH) and lock washer from guide key keeper plate (AG). Remove guide key keeper plate and guide key (AF). Remove jam nut from end of main operating screw, and remove lock washer. Drive the bevel gear (AR) off main operating screw. Tap out the main screw feather key (AM). Turn the main operating screw (AL) out of the frame bracket. Pull lower leg out of the frame bracket.

c. **Remove Bearings, Retainer and Main Screw Nut.** Remove



## LANDING GEAR

bearing cone (AQ). Do not remove bearing cup. The bearing cup is a pressed fit and will last the life of the hand gear. Wipe the grease off bearing cup, and inspect the cup for cracks. If the cup is cracked, pull the cup out. Remove thrust bearing (AO) and thrust washer (N). Place a screwdriver under end of retainer ring (AK), pry the retainer ring out of the lower leg, and remove the main screw nut (AJ).

### 122. CLEANING AND INSPECTION.

a. **Cleaning.** Steam clean all parts with the exception of the gear cover gasket.

b. **Inspection.** Inspect bevel gear shaft bushings for excessive wear, replace if necessary. Check crank bracket bushing for excessive wear. Check all bearings to make certain they are not chipped or damaged. Replace if necessary. Inspect the thread of main operating screw for damage. If the threads are burred, use a file and dress the threads as needed. Lay the main operating screw on a flat surface, and roll the screw to detect for bend. If screw is bent, straighten or replace. Insert a  $\frac{1}{8}$ -inch rod into the lubrication fitting holes to open.

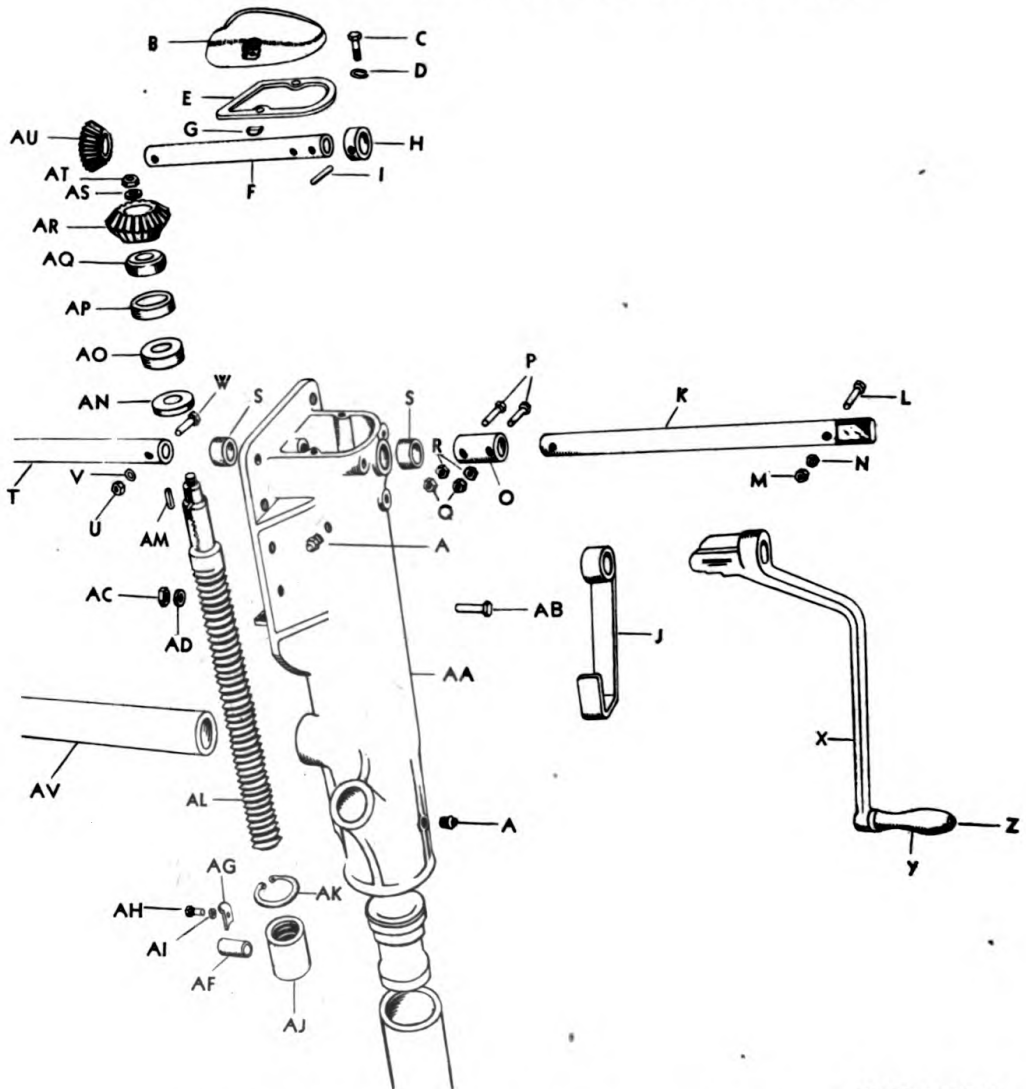
### 123. ASSEMBLY (fig. 142).

a. **Install Bevel Gear.** If bevel gear shaft bushing (S) has been removed from frame bracket, press in new bushing and ream to 1-inch diameter. Place main screw nut (AJ) into cavity at top of lower leg, and lock the main screw in position using retainer ring (AK). If bearing cup (AP) has been removed, press in the bearing cup. Place thrust washer (N) over end of main operating screw. Place thrust bearing next to, and above, thrust washer and position the main operating screw into lower end of frame bracket. Install feather key (AM) into end of main operating screw. Install bevel gear on end of main operating screw, and secure lock washer (AS and jam nut AT).

b. **Install Lower Leg.** Place frame bracket over lower leg and turn the main operating screw into lower leg. Continue turning main operating screw until main screw nut is visible through hole on inner side of frame bracket. Install screw nut guide key (AF) into main screw nut and secure the screw nut guide to frame bracket with the guide key keeper plate (AG), lock washer, and nut.

c. **Install Bevel Gear and Shaft.** Install bevel gear shaft into frame bracket from the outer side and turn the bevel gear shaft so that the keyway is visible from top of frame bracket. Install Woodruff key into bevel gear shaft. Place bevel gear into frame bracket, and aline the hole in bevel gear with hole in frame bracket. Aline

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)



RA PD 335269

Figure 142 — Landing Gear Disassembled

Woodruff key with keyway in bevel gear, and tap the bevel gear shaft into the bevel gear until the Woodruff key is in the center of the bevel gear. Place bevel gear shaft collar (H) over inner end of bevel gear shaft. Secure the bevel gear shaft collar in position using pin (I). If the left-hand landing gear is being assembled, place a bevel gear shaft collar over both ends of the bevel gear shaft and secure the collar in position, using pin. Fasten crankshaft coupling to bevel gear shaft using one  $\frac{3}{8}$ -inch bolt, nut, and lock washer.

d. **Install Bevel Gear Cover.** Place bevel gear cover gasket over top of frame bracket. Place bevel gear cover over gasket, and aline holes in gear cover and gear cover gasket. Secure cover with cap screws and lock washers. Install the three lubrication fittings and lubricate the assembly (par. 18).

**LANDING GEAR**

|          |                                    |           |                                  |
|----------|------------------------------------|-----------|----------------------------------|
| <b>A</b> | <b>ALEMITE FITTING</b>             | <b>Y</b>  | <b>CRANK HANDLE</b>              |
| <b>B</b> | <b>BEVEL GEAR COVER</b>            | <b>Z</b>  | <b>CRANK HANDLE RIVET</b>        |
| <b>C</b> | <b>CAP SCREW</b>                   | <b>AA</b> | <b>RIGHT-HAND BRACKET, FRAME</b> |
| <b>D</b> | <b>LOCK WASHER</b>                 | <b>AB</b> | <b>BOLT</b>                      |
| <b>E</b> | <b>GEAR COVER GASKET</b>           | <b>AC</b> | <b>NUT</b>                       |
| <b>F</b> | <b>RIGHT HAND BEVEL GEAR SHAFT</b> | <b>AD</b> | <b>LOCK WASHER</b>               |
| <b>G</b> | <b>WOODRUFF KEY, No. 15</b>        | <b>AE</b> | <b>LOWER LEG</b>                 |
| <b>H</b> | <b>BEVEL GEAR SHAFT COLLAR</b>     | <b>AF</b> | <b>SCREW NUT GUIDE KEY</b>       |
| <b>I</b> | <b>BEVEL GEAR SHAFT COLLAR PIN</b> | <b>AG</b> | <b>GUIDE KEY KEEPER PLATE</b>    |
| <b>J</b> | <b>CRANK HOLDER</b>                | <b>AH</b> | <b>CAP SCREW</b>                 |
| <b>K</b> | <b>CRANK SHAFT</b>                 | <b>AI</b> | <b>LOCK WASHER</b>               |
| <b>L</b> | <b>CRANK HANDLE BOLT</b>           | <b>AJ</b> | <b>MAIN SCREW NUT</b>            |
| <b>M</b> | <b>CRANK HANDLE NUT</b>            | <b>AK</b> | <b>RETAINING RING</b>            |
| <b>N</b> | <b>LOCK WASHER</b>                 | <b>AL</b> | <b>MAIN OPERATING SCREW</b>      |
| <b>O</b> | <b>CRANKSHAFT COUPLING</b>         | <b>AM</b> | <b>MAIN SCREW FEATHER KEY</b>    |
| <b>P</b> | <b>CRANKSHAFT COUPLING BOLT</b>    | <b>AN</b> | <b>THRUST WASHER</b>             |
| <b>Q</b> | <b>NUT</b>                         | <b>AO</b> | <b>THRUST BEARING</b>            |
| <b>R</b> | <b>PLAIN WASHER</b>                | <b>AP</b> | <b>BEARING CUP</b>               |
| <b>S</b> | <b>BEVEL GEAR SHAFT BUSHING</b>    | <b>AQ</b> | <b>BEARING CONE</b>              |
| <b>T</b> | <b>INTER-BEVEL GEAR SHAFT</b>      | <b>AR</b> | <b>BEVEL GEAR</b>                |
| <b>U</b> | <b>NUT</b>                         | <b>AS</b> | <b>WASHER</b>                    |
| <b>V</b> | <b>LOCK WASHER</b>                 | <b>AT</b> | <b>JAM NUT</b>                   |
| <b>W</b> | <b>BOLT</b>                        | <b>AU</b> | <b>BEVEL GEAR</b>                |
| <b>X</b> | <b>CRANK</b>                       | <b>AV</b> | <b>CROSS TUBE</b>                |

**RA PD 3352698**

***Legend for Figure 142 — Landing Gear Disassembled***

**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)**

**Section XXIX**

**TROLLEY HOIST**

**124. GENERAL.**

a. The trolley hoist, its components and functions are described in paragraph 14. Paragraph 80 describes the replacement of the chain hoist hand sheave, hand chain, and brake parts. The procedures in paragraph 125 and 126 cover the complete disassembly, and assembly of the chain hoist and trolley, respectively.

**125. CHAIN HOIST.**

a. **Disassembly (fig. 143).**

(1) **REMOVE CHAIN GUIDE, CHAIN SHEAVE AND BRAKE DISKS.** Refer to paragraph 80 a (1) and (2).

(2) **REMOVE LOAD CHAIN AND DRIVING PINION.** Remove end bolt (W) and pull load chain out of sheave. Remove the three screws and washers securing gear cover (AC), and then remove cover. Remove driving pinion (AD), and again position assembly with spur gears underneath.

(3) **SEPARATE CAES.** Remove nuts and washers from large separator (AF), small separator (Z), and load chain guide bolt (Y). Lift ratchet case (Q) away from assembly. Remove top hook (AL), one suspension plate (R), load chain guide (W) and stripper (V).

(4) **DISASSEMBLE PINION CAGE AND LOAD SHEAVE.** Turn internal gear so it is supported by bolts (AI), (Y), and (Z), and drive the load sheave (A) out of the cage (AG). Remove the two tapered pins. Remove suspension plate, and tap or pull the bearings from the load sheave. Remove inner retainers (P) from the load sheave, and remove the felt retainer (M) and washer (N) from the bearing bore in the internal gear. Remove pins securing axles (AB), and remove axles and the gear and pinion assemblies (AA).

b. **Cleaning and Inspection.** Clean all metal parts with dry-cleaning solvent. Use compressed air and blow out between bearing balls and races with hose nozzle held square with side of bearing. When dry, lightly oil the bearings, and inspect for roughness of rotation and excessive looseness. Replace as needed. Inspect all other parts for wear or fracture and make the necessary replacements. Always use new oil retainers, felt retainers and washers and new leather disk. Examine chains, top hook, and load hook for wear, or cracks. If either the load sheave or load chain require replacement, both must be replaced.

## TROLLEY HOIST

### c. Assembly.

(1) **LOAD SHEAVE AND CAGE.** Position pinion and gear assemblies (AA) in cage and install axles and locking pins. Position inner oil retainers (P) on shoulders of load sheave hubs. Install bearings on hubs. Place felt retainer (M) and felt washer (N), in that order, into load sheave bearing bore. Place suspension plate (R) over hub of internal gear. Set longer load sheave hub into bore of internal gear, and tap until bearing is seated. Reverse assembly so it is supported by the bolts (AI), (Y), and (Z), and block up under short hub of sheave. Aline cage (AG) so that tapered pin holes in cage, and load sheave are alined. Have gear and pinion assemblies turned so that the holes in the outer edges of the gears are at the center, and alined with each other. Drive the cage onto the sheave hub, and install the two tapered pins. Install the driving pinion (AD), and turn the assembly so it rests on cage (AG).

(2) **ASSEMBLE RATCHET CASE.** Aline holes in suspension plates so that one end of the cross head is in its bearing surface in the internal gear casting. Place load chain guide onto load chain guide bolt (Y). Position pivots of load chain guide (W) and stripper (V) in their respective holes in the internal gear casting. Set ratchet case over end of driving pinion onto assembly. Guide the load sheave bearing and the pivots of cross head, chain guide and stripper into their respective holes as the ratchet case goes over the bearing, two separators and the guide bolt. Secure in place with lock washers and nuts. Lubricate pinions in pinion cage. Install gear cover, and secure with screws and lock washers.

(3) **INSTALL LOAD CHAIN.** Start load chain into load sheave and rotate drive pinion to carry chain over sheave. Secure end of load chain, just started over sheave, in the load chain guide, and secure with bolt, nut, and washer.

(4) **INSTALL BRAKE PARTS, HAND SHEAVE, AND CHAIN.** Refer to paragraph 80 b (2).

## 126. TROLLEY.

a. **Disassembly** (fig. 144). Remove cotter pin and adjusting washers from one end of clevis pin and pull pin out of the two frame assemblies. Remove nuts and washers from axles and tap axles out of frames.

b. **Cleaning and Inspection.** Clean all parts with dry-cleaning solvent. Inspect bearings in wheels for serviceability and, if defective, replace the wheels. Check the side frames for cracks and examine the suspension clevis for hole elongation or fracture.

c. **Assembly.** Install wheels and axles into side frames maintaining the parts relationship shown in figure 144. Install cotter pin in

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

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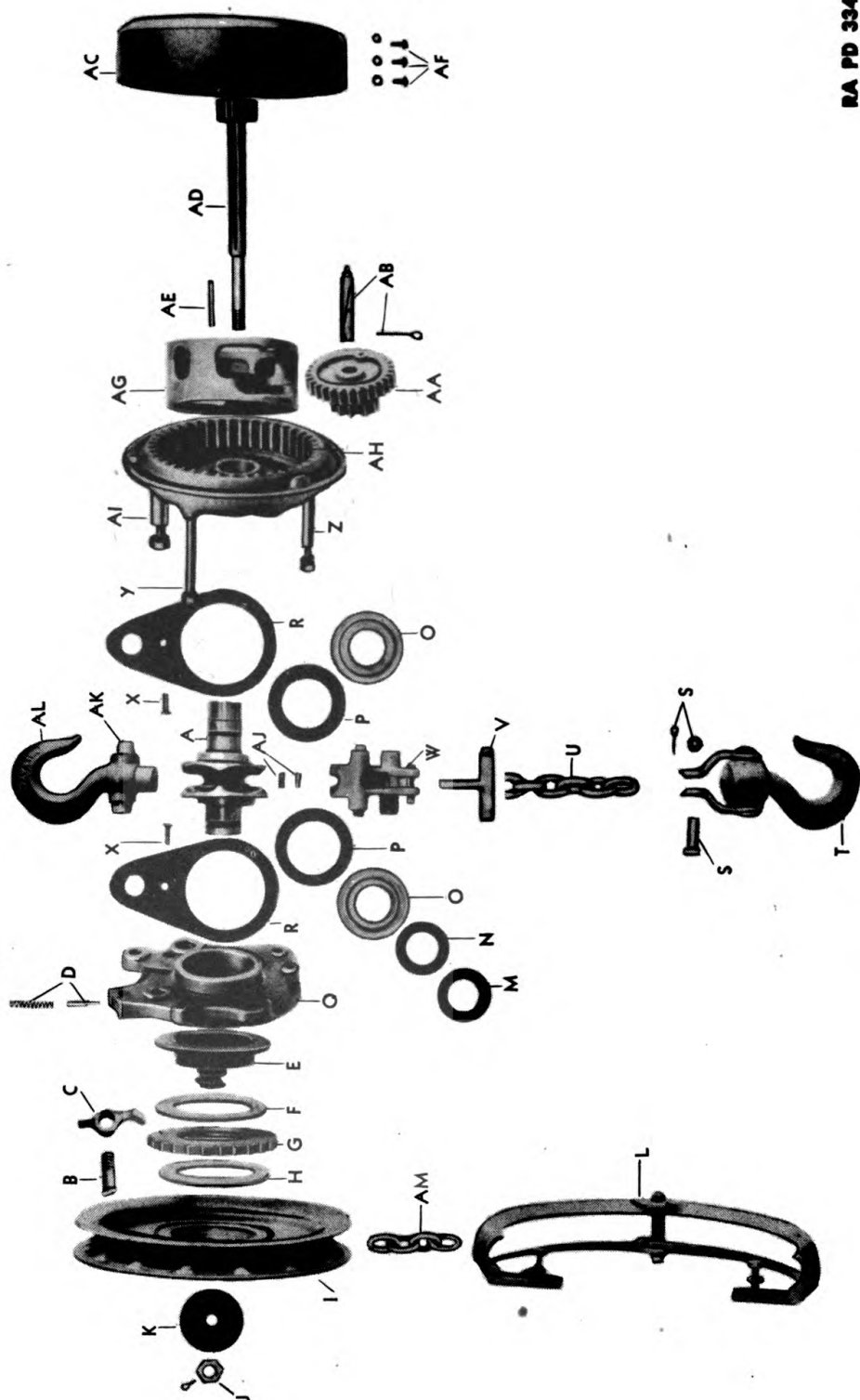


Figure 143 — Chain Hoist Disassembled



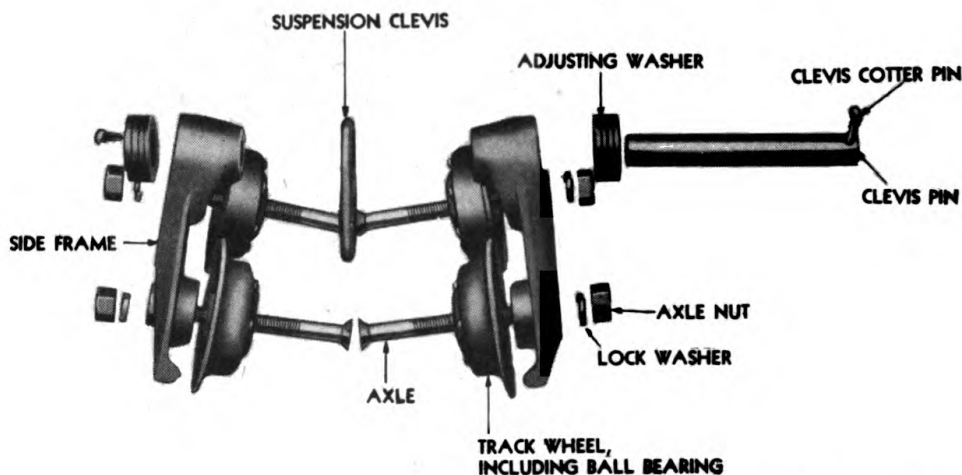
TROLLEY HOIST

|   |                                      |    |                             |
|---|--------------------------------------|----|-----------------------------|
| A | LOAD SHEAVE                          | U  | LOAD CHAIN                  |
| B | PAWL STUD                            | V  | STRIPPER                    |
| C | PAWL                                 | W  | LOAD CHAIN GUIDE & END BOLT |
| D | PAWL SPRING & ROD                    | X  | SUSPENSION PLATE RIVET      |
| E | HUB                                  | Y  | LOAD CHAIN GUIDE BOLT & NUT |
| F | LEATHER DISK                         | Z  | SMALL SEPARATOR & NUT       |
| G | RATCHET DISK                         | AA | GEAR & PINION               |
| H | IRON DISK                            | AB | PINION PIN & LOCK           |
| I | HAND WHEEL                           | AC | GEAR COVER                  |
| J | DRIVING PINION, NUT & COTTER PIN     | AD | DRIVING PINION              |
| K | CHECK WASHER                         | AE | HUB KEY                     |
| L | HAND CHAIN GUIDE                     | AF | GEAR COVER SCREW & WASHER   |
| M | OUTER FELT RETAINER                  | AG | PINION CAGE                 |
| N | OUTER FELT WASHER                    | AH | INTERNAL GEAR               |
| O | BALL BEARING                         | AI | LARGE SEPARATOR & NUT       |
| P | INNER OIL RETAINER                   | AJ | LOAD SHEAVE KEY             |
| Q | RATCHET CASE                         | AK | TOP CROSS HEAD              |
| R | SUSPENSION PLATE                     | AL | TOP HOOK                    |
| S | DETACH, SHACKLE BOLT, & NUT & COTTER | AM | HAND CHAIN                  |
| T | LOAD HOOK                            |    |                             |

RA PD 334925 B

Legend for Figure 143 — Chain Hoist Disassembled

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RA PD 335266

**Figure 144 — Trolley Disassemblea**

one end of clevis pin and place one set of adjusting washers onto clevis pin against cotter pin. Insert other end of clevis pin through one side frame, and install suspension clevis. Place second side frame onto clevis pin, and install second set of adjusting washers and second cotter pin.

### Section XXX

## JUMPER CABLE PLUG AND SOCKET

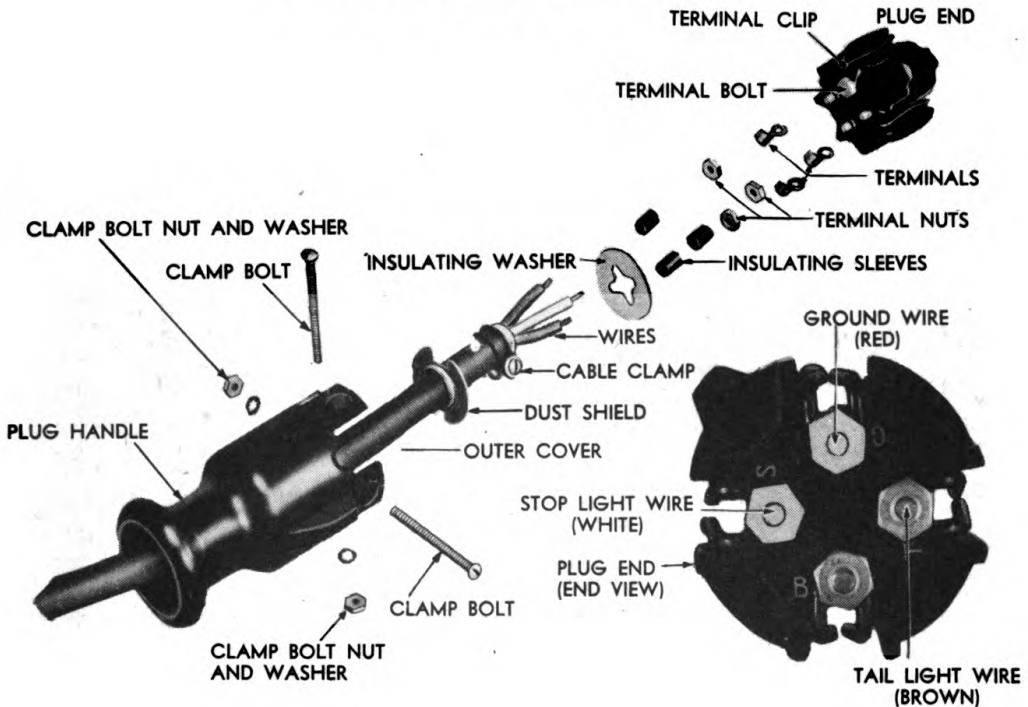
### 127. GENERAL.

a. The jumper cable is used to connect the electrical system on the towing vehicle with the trailer electrical system. It is composed of an outer cover enclosing three wires which have their terminals in the plugs at the cable ends. The plugs are designed to exactly fit the sockets on trailer and prime mover. When these plugs and sockets become plugged with dirt and moisture, they must be disassembled, and cleaned. Plugs are most frequently disassembled for replacement of cable or wires.

### 128. JUMPER CABLE PLUG.

a. **Disassembly.** Remove the nuts and washers from the two bolts through the plug handle, and remove the bolts. Pull handle away from plug end. Remove three terminal nuts, and disconnect wires from terminals. Unsolder terminals and pull wires out of sleeves and insulator. Loosen clamp around outer covering, and remove clamp and dust shield. Pull cable out of plug handle.

## JUMPER CABLE PLUG AND SOCKET



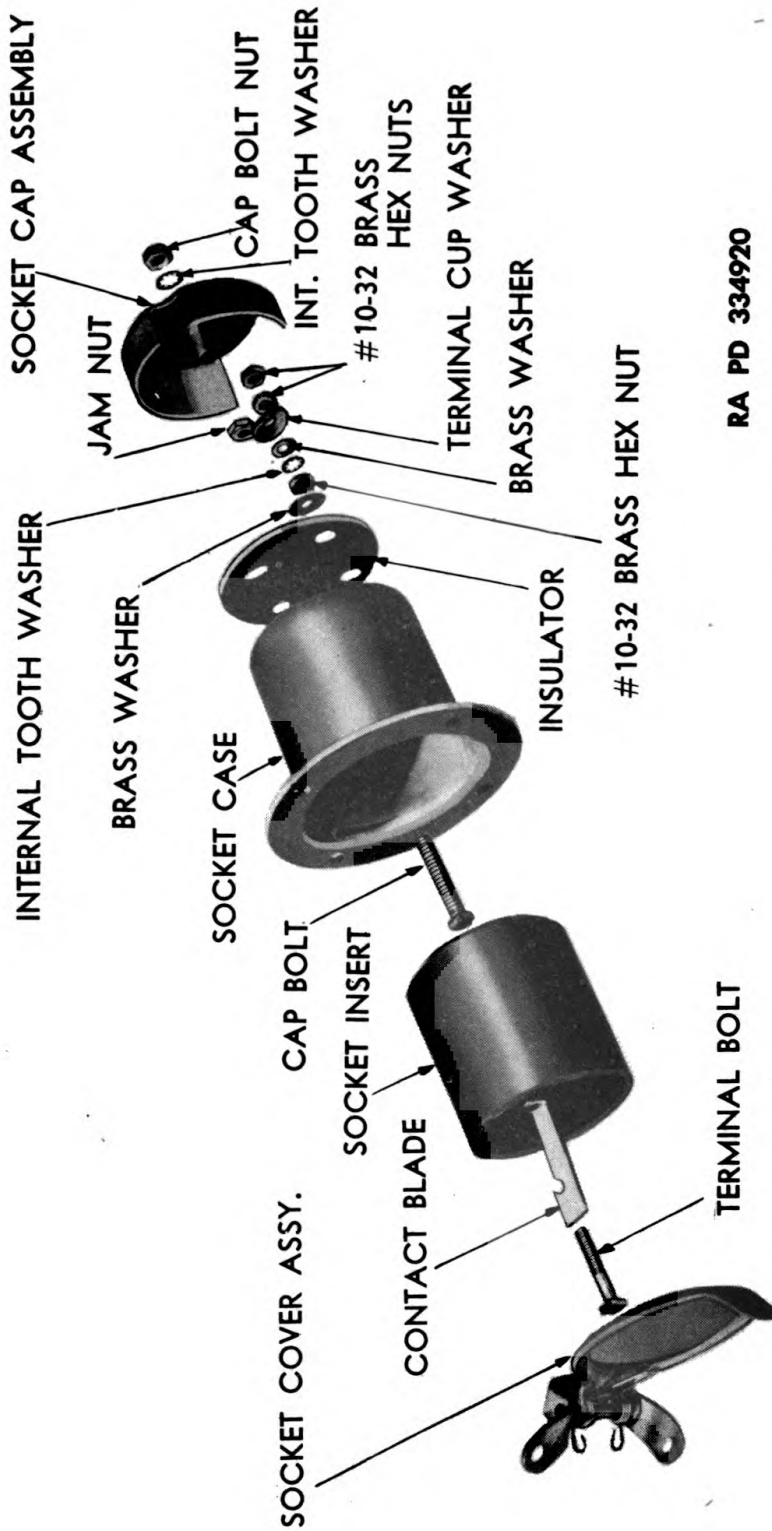
**Figure 145 — Jumper Cable Plug Disassembled**

b. **Assembly.** If plug has been used before, be sure all parts are clean. Remove outer cover of cable 1½ inches back from end, exposing individual rubber-covered wires. Remove insulation from wires ¾ inch back from end. Slide cable through plug handle. Place dust shield on cable, and assemble cable clamp as close to the end of cable as possible. Slip all wires through insulating washer, and slide insulating sleeves onto wires. Solder terminals onto wires, and slide insulating sleeves down over soldered ends of terminals. Place terminals through terminal clip onto bolts in plug end according to code shown in figure 145. Tighten nuts on terminals, and bend terminals up at a 90 degree angle after tightening. Slide plug handle down to plug end. Turn plug handle so bolt in cable clamp will not rest on top of either of the two lugs inside of plug handle. Be sure the key or guide on plug handle matches with key or guide on plug end. Assemble bolts through plug handle and plug end to secure the assembly.

### 129. JUMPER CABLE SOCKET.

a. **Disassembly** (fig. 146). If the hinged cover, dust shield, and dust shield retainer ring are attached, remove the four screws, nuts, and washers securing them, and remove the parts. Remove the cap bolt nut and washer, and remove the socket cap. Remove two brass nuts, terminal cup washer, brass washer, internal-toothed lock washer

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Figure 146 — Jumper Cable Socket Disassembled

## BODY

and a third brass nut from each of the four brass terminal bolts. Remove jam nut from cap bolt. Remove the large insulator, the terminal bolts, and the cap bolt. Remove the four contact blades and the bakelite insert.

**b. Cleaning and Inspection.** Carefully clean all corrosion, dirt or other foreign matter from socket and parts. Examine insert and insulator for cracks or breaks which might be responsible for shorted circuit. Replace rubber dust shield, and if the cover hinge spring lacks tension, replace the cover.

**c. Assembly.** Place bakelite insert into socket case and align terminal bolt holes. Insert each terminal bolt through the hole in its respective contact blade, and install contact blades and bolts by pushing the bolts through the holes in the bottom of the socket case. Install the socket cap bolt down through the hole in the center of the socket. Install the large insulator over the five bolts, and secure with the cap bolt jam nut. Install a brass washer and brass nut on each of the terminal bolts, and tighten. Install an internal-toothed lock washer, a brass washer, a terminal cup washer, and two brass nuts onto each terminal bolt. Install socket cap, and secure with nut and internal-toothed lock washer.

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## Section XXXI

## BODY

### 130. DESCRIPTION.

**a. General.** The trailer body is fabricated entirely by welding. For this reason, maintenance on the body is limited to the straightening or replacement of the steel plates and brackets which make up the whole welded assembly. The positioning of most of these parts will be obvious after the defective part has been removed. Figures 147 and 148 are included here to assist in the installation or realinement of the parts illustrated.

### 131. BODY BRACKETS.

**a. Towing Connection Plate.** In straightening or replacing these plates, be certain to hold to the center line measurements shown in B, figure 147. Make certain, too, that the yoke block pin holes in the two plates have a common center.

**b. Door Hinge.** Replace the continuous door hinge according to the measurements shown at A, figure 147. Be sure the sides of the hinge are flat, and that the formed portions secured by the hinge pin are straight.

TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)

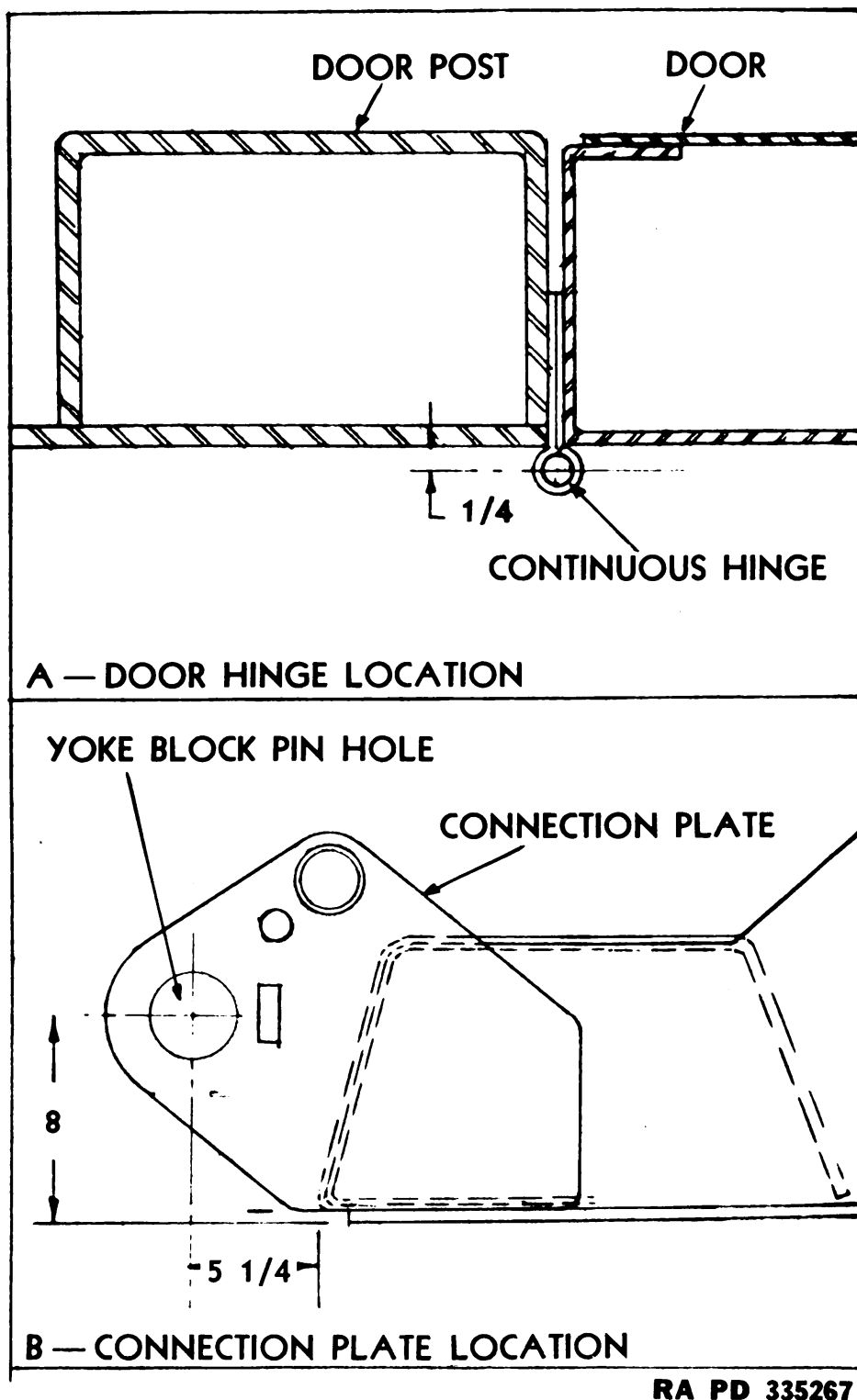
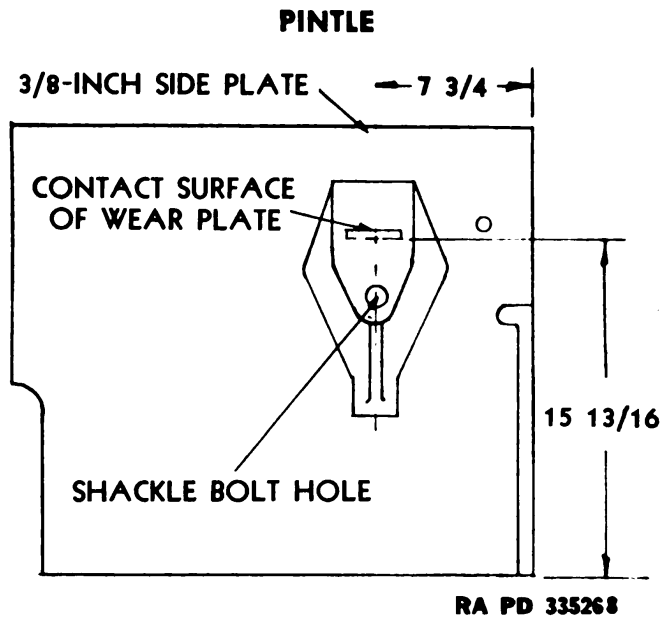


Figure 147 — Location of Welded Assemblies





**Figure 148 – Location of Rear Spring Shackle**

c. **Rear Shackle.** The rear shackle is located on a  $\frac{3}{8}$ -inch plate as shown in figure 148. The measurement from the bottom of the plate to the under side of the wear plate is extremely important and must be adhered to (fig. 148).

## Section XXXII

### PINTLE

#### 132. DESCRIPTION (fig. 149).

a. **General.** The pintle is an assembly composed of a heavy duty pintle hook assembly and a spring-loaded housing assembly. The hook shaft rotates in, and draws against, a partially compressed helical spring, bushed at each end, and enclosed by the split housing. Wear on the spring ends, bushings, and that area of the pintle hook shaft which bears on the bushings, is reduced by the lubricant which is maintained at shaft level in the housing. The pintle hook latch swivels away from the hook when open and, when closed, is secured by a spring-loaded latch lock which is retained by a lock pin in its closed position.

#### 133. DISASSEMBLY (fig. 149).

a. **Remove Pintle Hook Shaft.** Remove cotter pin securing pintle hook nut, and remove nut. Pull pintle hook shaft out of housing.

b. **Disassemble Housing.** Remove the four mounting bolts if they are still in the housing. Install and tighten a C-clamp near each of

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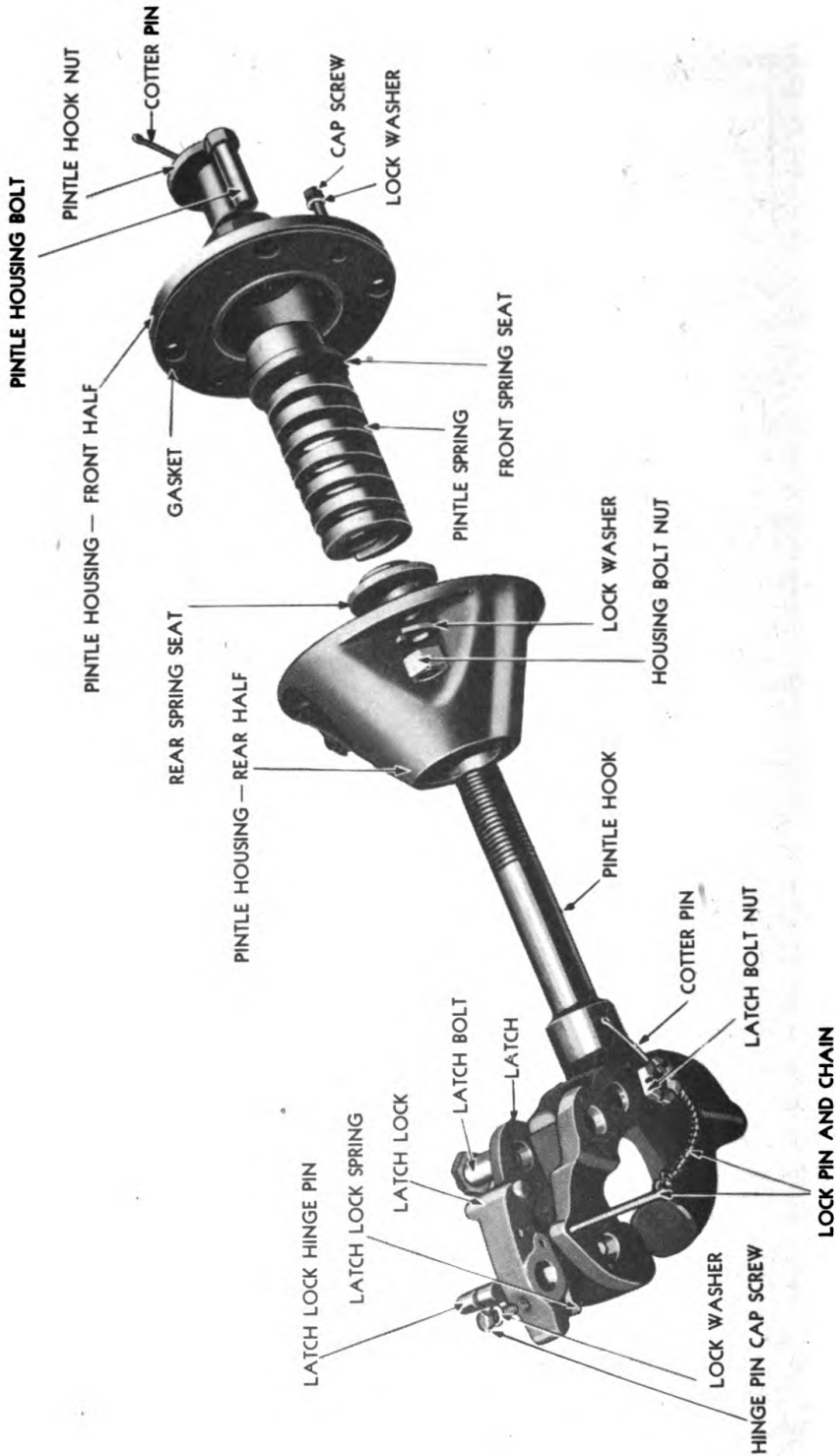


Figure 149 — Pinle Disassembled

## PINTLE

the four mounting bolt holes. Remove the two cap screws, and lock washers which secure the two housing valves. Alternately, loosen each pair of opposite C-clamp screws one-half turn until the compression of the helical spring is no longer felt, or until the four C-clamps are loose on the housing. Remove the clamps. Lift out the two bushings, the helical spring and the gasket.

c. **Disassemble Pintle Latch and Lock.** Remove cap screw and lock washer securing latch lock pin, and remove pin and latch lock. Remove cotter pin and nut securing latch bolt, and remove bolt and latch.

### 134. CLEANING AND INSPECTION.

a. **Cleaning.** Clean all old lubricant out of both halves of housing. Wash all parts in dry-cleaning solvent, and allow to dry.

b. **Inspection.** Examine pintle hook shaft, bushings, spring, and housing halves for fracture or signs of breaking. See that threads on shaft and in nut are in serviceable condition. Check latch bolt for wear and note whether or not latch lock spring is present and in good condition. If pintle hook shaft is worn in excess of 0.030 inch at the points where it bears on the bushings, replace the shaft. If bushings are worn 0.030 inch at the points where it bears on the bushings, replace bushings. Measure free length of spring. If less than 6½ inches, it must be replaced.

### 135. ASSEMBLY.

a. **Assemble Pintle Hook Latch and Lock.** Position latch onto hook so that holes are alined and install latch bolt, nut, and cotter pin. Aline pin hole in latch lock with holes in latch, and install latch lock pin with recess at center of pin alined with cap screw hole in latch lock. Install cap screw and lock washer and tighten.

b. **Assemble Pintle Hook and Housing.** Clamp the stationary jaw of the pintle hook shaft in a vise so that the threaded end of the shaft is uppermost. Maintaining the parts relationship shown in figure 149, place the housing half having the lubricant plug, the smaller spacer, the spring, and larger spacer onto the shaft. Wipe the mating surface of the housing half just installed, and install the gasket with holes in gasket alined with holes in housing. Position other half of housing so that holes in both halves are alined, and arrange the four C-clamps as in paragraph 133 b. Tighten each pair of clamps one-half turn alternately until the pintle hook nut can be started onto the shaft. Screw nut onto the shaft being careful to keep all mating holes in the housing halves and gasket alined. As soon as it is possible, install the housing cap screws and draw them down alternately, until the mating surfaces are clamped together. Tighten pintle hook shaft nut, and secure with the cotter pin.

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Section XXXIII

**HEAVY CARRIAGE LIMBER M5**

**136. GENERAL.**

a. The Heavy Carriage Limber M5 is described in paragraph 92. Procedures for operations which are assigned to ordnance personnel but which may be done by the using arm are described in paragraphs 95, 98 and 100.

**137. SPINDLE AND BUSHINGS.**

a. **Cleaning and Inspection.** Wash upper and lower bushing with dry-cleaning solvent. Remove all old lubricant, and thoroughly clean the axle housing around the bushings. Measure the flange of the upper bushing, if less than 0.500 inch, replace the bushing. If the inside diameter of the upper bushing is more than 4.037 inches, replace the bushing. Measure the inside diameter of the lower bushing. If this measurement is greater than 2.273 inches, replace the bushing. The upper, or larger, bearing surface on the spindle, when new, has a dimension of 4.000 inches. If it measures 3.980 inches, or less, replace the spindle. The lower bearing surface is 2.250 inches when new. If this surface measures less than 2.238 inches, replace the spindle.

**b. Lower Bushing.**

- (1) **REMOVE LOWER BUSHING.** Press out lower bushing.
- (2) **INSTALL LOWER BUSHING.** Aline lubricant hole in bushing with lubrication fitting hole in axle, and press into place. Ream to 2.250 inches. Remove lubrication fitting, and push a  $\frac{3}{8}$  inch rod through the lubrication fitting hole in axle and bushing.

**c. Upper Bushing.**

- (1) **REMOVE BUSHING.** Press bushing out of axle.
- (2) **INSTALL BUSHING.** Aline lubricant hole in bushing with lubrication fitting hole in axle, and press bushing into place. See that the upper flanged surface is smooth and flat, and ream inside diameter to 4.017 inches. Clear the lubricant holes in bushing and axle. **NOTE:** *This bushing takes the weight of the load placed on the towing bracket as well as the major part of the lateral and longitudinal thrust of the total towed load. For this reason it is important that no departures be made from the recommended tolerances.*

**138. BRACKET ROCKER PIN AND BUSHINGS.**

a. **Cleaning and Inspection.** Use dry-cleaning solvent and clean the rocker pin and the bushings in the towing bracket. The rocker

## HEAVY CARRIAGE LIMBER M5

pin has a new outside diameter of 2.500 inches. The inside diameter of the bushings is 2.505 inches when new. Replace the rocker pin, if it measures less than 2.485 inches. Replace the bushings, if they measure more than 2.520 inches. If a replacement is necessary, always renew both bushings.

**b. Remove Bushings.** Drive or press front bushing toward the center of the bracket, and out of its bore. Use a bushing puller on the rear bushing, and pull the bushing forward, and out of its bore.

**c. Install Bushings.** Use a bushing replacer, and install bushings with their flanges toward the center of the bracket. Ream to 2.505 inches.

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## APPENDIX

### Section XXXIV

## SHIPMENT AND LIMITED STORAGE

### 139. GENERAL INSTRUCTIONS.

a. Preparation for domestic shipment of the vehicle is the same with the exception of minor added precautions as preparation for limited storage. Preparation for shipment by rail includes instructions for loading the vehicle, blocking necessary to secure the vehicle on freight cars, and other information necessary to properly prepare the vehicle for domestic rail shipment. For more detailed information and for preparation for indefinite storage, refer to AR 850-18.

### 140. PREPARATION FOR LIMITED STORAGE.

a. Vehicles to be prepared for limited storage are those ready for immediate service, but not to be used for a period of less than 30 days. If vehicles are to be indefinitely stored after shipment by rail, they will be prepared for such storage at their destination.

b. If the vehicles are to be placed in limited storage, take the following precautions.

(1) **LUBRICATION.** Lubricate the vehicle completely (par. 18).

(2) **TIRES.** Clean, inspect, and properly inflate all tires, including spares. Replace with serviceable tires, all tires requiring repairing or retreading. Do not store vehicle on floors, cinders, or other surfaces which are soaked with oil or grease. Wash off immediately any oil, grease, gasoline, or kerosene which comes in contact with tires under any circumstances.

(3) **ROAD TEST.** The preparation for limited storage will include a road test after the lubrication service to check on the general condition of the vehicle. Correct any defects noted in the vehicle operation before the vehicle is stored, or attach a tag in a conspicuous place, stating the repairs needed or describing the condition present. A written report of these items will then be made to the officer in charge.

(4) **EXTERIOR OF VEHICLE.** Remove rust appearing on any part of the vehicle exterior with flint paper. Repaint painted surfaces whenever necessary to protect wood or metal. Coat exposed polished metal surfaces susceptible to rust, such as chains, with medium grade preservative lubricating oil. Close the rear doors. Stow the trolley, hoist pole, and boom assemblies.

(5) **INSPECTION.** Make a systematic inspection just before shipment or limited storage to insure all above steps have been covered,



## SHIPMENT AND LIMITED STORAGE

and that the vehicle is ready for operation on call. Make a list of all missing or damaged items, and attach it in a conspicuous place. Refer to Before-operation Service (par. 20).

(6) **BRAKES.** Release brakes and chock wheels.

c. **Inspection in Limited Storage.** Vehicles in limited storage will be inspected weekly for tire failures, evidence of vandalism, tampering, etc.

### 141. LOADING AND BLOCKING FOR RAIL SHIPMENT.

a. **Preparation.** In addition to the preparation described in paragraph 140, when ordnance vehicles are prepared for domestic shipment, the following preparation and precautions must be taken.

(1) **EXTERIOR.** Cover the body of the trailer with the canvas cover supplied as an accessory, or available for use during rail shipment.

(2) **RAILROAD BRAKE WHEEL CLEARANCE.** Place the vehicle in position with a railroad brake wheel clearance of at least 6 inches. The vehicles will be located on the car in such a manner as to prevent the car from carrying an unbalanced load.

(3) All cars containing ordnance vehicles must be placarded "DO NOT HUMP."

(4) Ordnance vehicles may be shipped on flat cars, end door box cars, side door cars, or drop end gondola cars, whichever type car is most convenient.

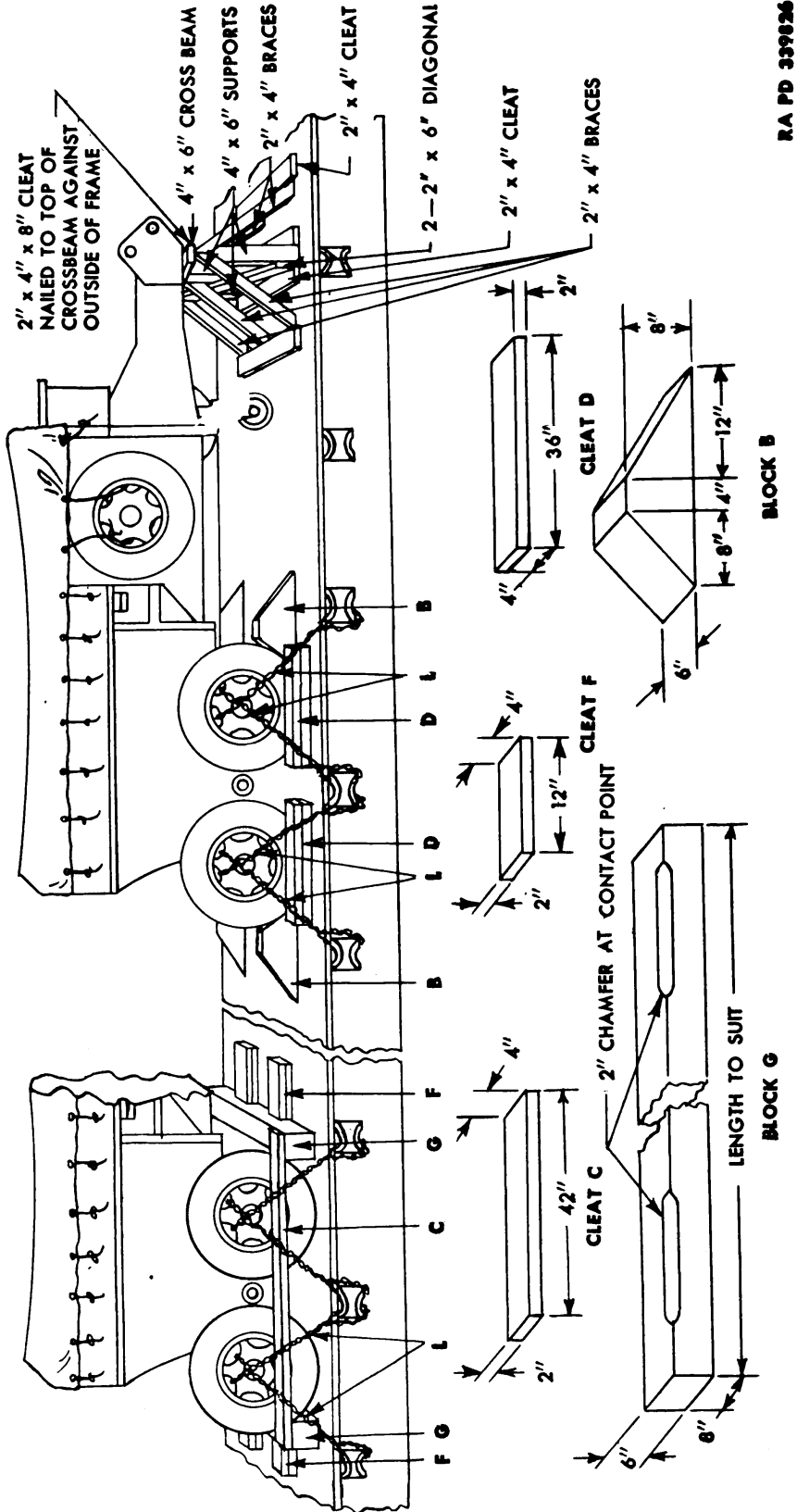
b. **Facilities for Loading.** Whenever possible, load and unload vehicles from open cars, using permanent end ramps and spanning platforms. Movement from one flat car to another along the length of the train is made possible by cross-over plates or spanning platforms. If no permanent end ramp is available, an improvised ramp can be made with railroad ties. Vehicles may be loaded in gondola cars without drop ends by using a crane.

c. **Securing Vehicles.** In securing or blocking a vehicle, three motions, lengthwise, sidewise, and bouncing, must be prevented. Two methods for blocking vehicle on freight cars (fig. 150) are given below. **NOTE:** *All wheel blocking must be located against the outside wheel of the dual.*

(1) **FIRST METHOD.**

(a) **Front of Vehicle.** Position supporting frame beneath the connection plates so that crossbeam is at right angles to the trailer frame. Nail one cleat (2- x 4- x 8-in.) to the top of the crossbeam against the outside of the frame on each side, using four 40-penny nails for each cleat (fig. 150). Toenail the three supports (fig. 150) to the car floor

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RA PD 339826

Figure 150 — Blocking Requirements for Rail Shipment

## SHIPMENT AND LIMITED STORAGE

using 40-penny nails. Toenail braces (fig. 150), and nail all cleats to the car floor with 40-penny nails.

(b) *Rear of Vehicle.* Place four blocks (B, fig. 150), one to the front of each forward wheel and one to the rear of each rearward wheel. Nail the heel of the block to the car floor with five 40-penny nails, and nail the portion of the block under the tire to the car floor with two 40-penny nails. Place two cleats (D, fig. 150) to the outside of each wheel (eight cleats (D) required). Nail the lower cleat to the car floor with three 40-penny nails, and nail the top cleat to the cleat below with three 40-penny nails.

(c) *Strapping Vehicle* (fig. 150). Secure vehicle in front (H) and at the side (J) by strapping, consisting of four strands, two wrappings, of No. 8 gage, black annealed wire, passed around the connection plate roller, and secured at the stake pockets of the railroad car. Secure vehicle at wheels (L) by passing wire through opposite openings in the wheels, and attaching at the closest stake pocket of the car.

### (2) SECOND METHOD.

(a) *Front of Vehicle.* The front of the vehicle is blocked the same as in first method (step (1) (a) above).

(b) *Rear of Vehicle* (fig. 150). Place one block (G) to the front of the forward wheels and one to the rear of the rearward wheels. Blocks (G) must be at least 8 inches longer than the over-all width of the vehicle at the car floor. Place cleats (C) against the outside face of the wheels on top of blocks (G). Nail cleats (C) to blocks (G) with 40-penny nails, using two nails at each end of cleat (C). Place cleats (F) against blocks (G), two to the front and two to the rear of each outside wheel. Nail each lower cleat to the car floor with three 40-penny nails, then nail each top cleat to the cleat below with three 40-penny nails.

(c) *Strapping Vehicle.* Strapping is applied in the second method as in step (1) (c) above.

### d. Shipping Data.

|                                                                                  |              |
|----------------------------------------------------------------------------------|--------------|
| Length of vehicle (over-all approximate).....                                    | 18 ft 5½ in. |
| Width of vehicle (over-all).....                                                 | 8 ft 8¾ in.  |
| Height of vehicle (over-all).....                                                | 6 ft 11 in.  |
| Shipping weight per vehicle.....                                                 | 10,710 lb    |
| Volume occupied per vehicle (approximate).....                                   | 1,133 cu ft  |
| Area of car floor occupied per vehicle (approximate).....                        | 161.87 sq ft |
| Bearing pressure (lb per sq ft of area occupied per vehicle) (approximate) ..... | 66           |

**TRAILER, AMMUNITION, M23 (8-TON, 4-WHEEL)**

**Section XXXV**

**REFERENCES**

**142. PUBLICATION INDEXES.**

The following publications indexes should be consulted frequently for latest changes or revisions of the references given in this section and for new publications relating to materiel covered in this manual:

- a. Introduction to Ordnance Catalog (explaining SNL system) ..... **ASF CAT.  
ORD 1 IOC**
- b. Ordnance Publications for Supply Index (index to SNL's) ..... **ASF CAT.  
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- b. **Ammunition.**  
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Ord 11, ammunition instruction material for pack, light and medium field, aircraft, tank, and antitank artillery ..... **SNL R-6**

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| Ord 11, projectiles and propelling charges, separate loading, for medium field artillery, including complete round data.....             | SNL R-2  |
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- c. Protection of Materiel.**
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- Chemical decontamination materials and equipment ..... **TM 3-220**
- Decontamination of armored force vehicles..... **FM 17-59**
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- d. Storage and Shipment.**
- Ordnance storage and shipment chart, group G-Major items ..... **OSSC-G**
- Registration of motor vehicles..... **AR 850-10**
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